Jembi Health Systems

Annual Report

2020/21

Head Office | Cape Town

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Abbreviations

AHIE	African Health Information Exchange	
AHRI	African Health Research Institute	
AIDS	Acquired Immunodeficiency Syndrome	
ANC	Antenatal Care	
ART	Antiretroviral Therapy	
BHPSA	Better Health Programme South Africa	
BSIS	Blood Safety Information System	
BSSP	Blood Safety Strengthening Programme	
CCDHI	Collaborating Centre for Digital Health Innovation	
CDC	United States Centers for Disease Control	
CHAI	Clinton Health Access Initiative	
CMR	Republic of Cameroon	
DISI	Data Integration Strategies and Implementation	
DSI	Department of Science and Innovation	
EAC	Enhance Adherence Counselling	
EMR	Electronic Medical Record	
FCO	Foreign and Commonwealth Office	
GIC	Global Informatics Collaborative	
GIZ	German Agency for International	
GSM	Global System for Mobile Communications	
GU	Georgetown University	
HIE	Health Information Exchange	
HIS	Health Information Systems	
ΗΙΥ	Human Immunodeficiency Virus	
ІСТ	Information and Communications	

M&E	Monitoring and Evaluation	
MNCH	Maternal, Newborn, and Child Health.	
МоН	Ministry of Health	
MoU	Memorandum of Understanding	
NACC	National AIDS Control Commission of Cameroon	
NCD	Non-Communicable Diseases	
NDoH	National Department of Health	
оно	Office of the Health Ombud	
OHSC	Office of Health Standards Compliance (OHSC) and the (OHO).	
PCR	Polymerase chain reaction	
PEPFAR	US President's Emergency Plan for AIDS Relief	
PHDC	Provincial Health Data Centre	
РМТСТ	Prevention of mother-to-child transmission	
RTG	NACC Regional Technical Group	
SA-NDoH	South African National Department of Health	
SAMRC	South African Madical Pacaarah Council	
SI-M&A	Monitoring and Evaluation Information System (Mozambique)	
SI-M&A SIS-MA	Monitoring and Evaluation Information System (Mozambique) National Health Information System for Monitoring and Evaluation (Mozambique)	
SI-M&A SIS-MA TB	Monitoring and Evaluation Information System (Mozambique) National Health Information System for Monitoring and Evaluation (Mozambique) Tuberculosis	
SI-M&A SIS-MA TB UCSF	Monitoring and Evaluation Information System (Mozambique) National Health Information System for Monitoring and Evaluation (Mozambique) Tuberculosis University of California San Francisco	
SI-M&A SIS-MA TB UCSF UCT	South Amcan Medical Research CouncilMonitoring and Evaluation InformationSystem (Mozambique)National Health Information System for Monitoring and Evaluation (Mozambique)TuberculosisUniversity of California San FranciscoUniversity of Cape Town	
SI-M&A SIS-MA TB UCSF UCT USAID	Monitoring and Evaluation Information System (Mozambique) National Health Information System for Monitoring and Evaluation (Mozambique) Tuberculosis University of California San Francisco University of Cape Town United States Agency for International Development	

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Letter from the Chief Executive Officer



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Jembi was fortunate to begin two new five-year awards with the CDC in Mozambique and South Africa in October 2020, which will potentially result in further increases over the five-year grant period. During this particularly difficult time amidst the global COVID-19 pandemic, I am pleased to be able to report on the accomplishments of Jembi in the 2020 to 2021 financial year. Despite the challenging circumstances, Jembi has continued to implement our vision and mission. 2020 was also a year of transition for Jembi as several projects came to a natural end and there was a substantial reduction of certain on-the-ground activities.

After a spike in turnover during the previous financial year, **Jembi's turnover stabilised at R86.6 million during this financial year** and staff numbers at 108. Jembi was fortunate to begin two new five-year awards with the CDC in Mozambique and South Africa in October 2020, which will potentially result in further increases over the five-year grant period.

During this period, Jembi also continued the process of rationalising its organogram around its two main programmes, supported by our Corporate Services division. The Mozambique programme operates in Mozambique with the majority of programmes and technical staff based in Maputo and some management staff based in South Africa. The Programmes Division operates projects in South Africa and a number of other countries in Africa, and it supports CDC HQ in the USA with staff based mainly in South Africa and some contractors in other African countries. Projects are being conducted in several African countries, including Cameroon, DRC, Ethiopia, Lesotho, Kenya, Uganda, South Sudan and Malawi. Jembi has consolidated activities around its core competencies in programme management, digital health, health informatics, health information systems, software and product development, and system integration. Some of the core technologies we support include: health information exchange, standards, system integration, mobile health and electronic medical record software.

Jembi's Corporate Services Division has continued to provide a high level of financial, legal, human resources, administrative and ICT support to Jembi's divisions, programmes and offices. The Finance team achieved another unqualified audit for this financial year. The ICT team has also diversified its IT operations, providing additional support to the programmes in specialised areas related to the deployment and implementation of ICT hardware and services. The HR team also developed a number of new policies for Jembi to strengthen the management of its human capital. Jembi's Mozambique Programme experienced another excellent year. The programme continues its longstanding partnership with CDC Mozambique. This was the final year of Jembi's second fiveyear cooperative agreement with CDC Mozambique, culminating in the successful award of a third five-year cooperative agreement. Jembi is supporting a number of key health information systems in Mozambique, including the national implementation of a medical record system for HIV patient and treatment management, based on OpenMRS as well as several additional projects with UN agencies and other international organisations and funders.

Jembi's South Africa-based Programmes Division consolidated its operations over this period under the leadership of new Jembi Programmes Director, Wayne Naidoo. The Programmes Division advanced and completed a number of key projects, including ongoing work on the HealthConnect project, funded by the South African Department of Science and Innovation and Elma Philanthropies; the innovative Journey immunisation app for cross-border populations; and the digital register system (OpenSRP) for perinatal health facilities in Malawi funded by GIZ. The Programmes Division also initiated four projects with PATH Digital Square over this period and continued the Better Health Programme South Africa funded by the British Foreign and Commonwealth Development Office through Mott MacDonald.

The Division continued its work with UCT in supporting the development of information systems for the Western Cape Provincial Health Data Centre, including for COVID-19 case management in the Western Cape province. A highlight of this period was the award of a five-year technical assistance programme with CDC headquarters. This flagship project includes the development and implementation of innovative new data integration projects in African countries supported by PEPFAR. The South African Medical Research Council (SAMRC) – Jembi Collaborating Centre for Digital Health Innovation (CCDHI) completed its final year of activities, some of which were delayed as a result of COVID restrictions.

It has been a pleasure and privilege to lead Jembi over this period and I firmly believe that Jembi will continue to deliver on its vision and mission into the future. It will also continue to adapt to the increased global interest in digital health.

With best wishes,

Dr Christopher Seebregts Founder and Chief Executive Officer

2017

Income *rose* by 61% to **ZAR 60.2 million**

Expenditure *rose* by 59% to **ZAR 58.5 million**

2018

Income rose by 11% to ZAR 66.6 million Expenditure rose by 15% to ZAR 67.2 million

2019

Income rose by 48% to **ZAR 98,6 million**

Expenditure *rose* by 46% to **ZAR 98 million**

2020

Income rose by 75% to **ZAR 172.2 million**

Expenditure *rose* by 75% to **ZAR 171.1 million**

2021

Income *reduced* by 50% to **ZAR 86.6 million**

Expenditure *reduced* by 49% to **ZAR 87 million**

Chairman's Report

In 2020 the COVID-19 pandemic rampaged through society, leaving very little untouched. Organisations had to rapidly adjust their operations to adapt to lockdown conditions. Besides the impact of the pandemic, 2020 was an important transition year for Jembi with many large projects reaching the end of their natural funding cycle. Considering these conditions, Jembi was fortunate to secure new long-term awards in Mozambique and South Africa and effectively consolidate and restructure its operations around these new programmes.

I am pleased to be able to reflect on Jembi's activities over the past year. Jembi, under the leadership of its visionary and dynamic CEO, Chris Seebregts, has effectively weathered a volatile and challenging period and has emerged with strong structures and programmes. Jembi's activities over the past year has certainly advanced the Jembi vision of "A world in which health systems and information advance global health".

The pandemic also brought to the fore the importance of and role of digital health solutions. Jembi continues to play a pioneering role in developing innovative health software applications and enabling interoperability between siloed health information systems. This includes its work on electronic medical record systems, health information exchanges and mobile applications. Jembi is also exploring emerging technologies, such as artificial intelligence, and how these technologies can be used to further enable and unlock the potential of digital health applications and systems in Africa. Jembi's innovative approach to digital health strongly equips it to participate in this new reality with its strong and established base in Programmes, Technology and Corporate Services.

I would like to thank the members of the Jembi Board for their support and contribution during this period: Dr. Dayne Morkel (Deputy Board Chair), Dr Chris Seebregts (CEO), Dr. Quentin Williams, Mr. Andy Gray and Prof. Steve Reid, as well as Jembi's division and programme directors, Dr Alessandro Campione, Mr Wayne Naidoo and Ms Jonnea Smith. I would like to welcome Dr. Ziyanda Vundle as the new member of the Jembi board. Dr. Vundle brings a wealth of experience in public health. We will continue to recruit new Board members to inject new energy and to increase the diversity and representivity of the Jembi Board.

I also want to acknowledge and thank the many funders and donors who have contributed to Jembi's success and without whom this important work could not be undertaken. We have received substantial contributions from the South African Government, United States Government agencies, Italian Government, international donor agencies, private philanthropies, foundations, and corporate sources, to whom we remain indebted. Jembi has managed to diversify its sources of income during this year, and at the same time received increased funding from US Government sources. We look forward to the next phase of Jembi's journey with existing and new funders and partners.

I am happy to present to you Jembi's 2020/2021 Annual Report.



With kind regards,

Moodley Deshen

Dr Deshen Moodley Jembi Board Chairman

Associate Professor, Department of Computer Science, University of Cape Town Deputy Director, South African National Centre for Artificial Intelligence Research

Presentations

Programmes

HQ Programmes Division

Better Health Programme South Africa • Blood Safety Strengthening Programme • Child Healthcare EBR • CDC Technical Assistance Programme in Ethiopia • CDC Central Initiative • RAD Connectivity Box • Journey Immunisation Programme in Kenya and Uganda • HealthConnect App Store • MenConnect • CareConekta • Sesikhona Project with the Africa Health Research Institute • EMR development in Cameroon • CDR development in Ethiopia • Country Health Information and Data Use (CHISU) • DATIM/OpenHIE • OpenHIE COVID-19 Data Exchange • Instant OpenHIE • OpenHIM • Electronic Medicines List (EML) Guide • EmptyBoxes project • GIZ Malawi Emmunise Project • GIZ Malawi eRegister Project • Child Healthcare Problem Identification Programme (Child PIP) • SAMRC - Jembi Collaborating Centre for Digital Health Innovation (CCDHI) • Tracking with Recency Assays to Control the Epidemic (TRACE) • African Health Information Exchange (AHIE) • Women Social Impact Bond • CDC Cameroon COAG

Mozambique Programme

Electronic Patient Tracking System (EPTS) • PEPFAR Systems Documentation • Help Desk • PEPFAR Infrastructure • IT Technicians in the Provinces (ITPs) • HIS Support to the MoH • Civil Registration and Vital Statistics (CRVS) • Gender-based Violence (GBV) eIMD System • Capacity Building • OpenMRS Academy • EducaMoz • UNICEF Child Protection System Computerisation • Cardno Master Trainer • Data.FI • One Health and Veterinary Sciences • Social Events and Institutional Development

Overview

Over this financial period, the Programmes Division comprised 33 projects. These ranged from core interoperability platform development and related community support services (funded primarily through our Digital Square grants), to bespoke platform development and hardware infrastructure innovation projects.

Jembi continues to support core health system strengthening initiatives at a national scale in several African countries. These include supporting re-engineering of the national electronic medical records system in Cameroon, which was successfully delivered in 2020. Another project included development of a national digital health blueprint for Malawi. In South Africa, we supported research studies in partnership with leading local and international research institutions. In one such project, we designed advanced mobile health interventions to improve engagement in postpartum HIV care in South Africa.

Jembi has also partnered with CDC on the Technical Assistance

Programme with the aim of harmonising the significant investment of PEPFAR in digital health over the last decade. This project supports the development and implementation of sustainable HIS to enable advances in case-based surveillance, patient care coordination and programme monitoring. It is also providing a foundational resource centre through a Sandbox platform which is being developed by Jembi to advance strategic CDC digital health investments globally.

During this funding period, Jembi has also completed four different projects in partnership with the PATH Digital Square initiative funded by USAID. These projects provide advanced information systems based on health information exchange, e.g. InstantOpenHIE, as well as selected use cases, e.g. a COVID-19 data exchange and case management platform.

The Better Health Programme South Africa was also conducted over this period, including a number of projects supporting selected clusters



Wayne Naidoo, Director of Programmes

within the South African National Department of Health and parastatal agencies. Jembi also began working with John Snow International on the Country Health Information Systems and Data Use programme and with Palladium on the Data.FI project, both funded by USAID. Jembi also continued its work on the HealthConnect project, funded by DSI and Elma Foundation as well as the SAMRC Jembi Collaborating Centre for Digital Health Innovation.

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1. Better Health Programme South Africa

The Global Better Health Programme is part of the UK Foreign and Commonwealth Office's (FCO) Prosperity Fund. It aims to address the growing burden of Non-Communicable Diseases (NCDs) such as heart disease, diabetes, hypertension and cancer, and to strengthen local health system structures by creating systems to improve quality of care. As part of the Better Health Programme South Africa (BHPSA), managed by Mott MacDonald, Jembi leads the Digital Health Workstream, which cuts across all the other work streams.

During Year 1 of the programme, Jembi provided technical assistance to the Office of Health Standards Compliance (OHSC) and the Office of the Health Ombud (OHO). As a strategically important parastatal entity, its mission is to ensure that both public and private health establishments in South Africa comply with the required health standards, to support improved safety and quality of health services, and good patient experiences. The Jembi team conducted an assessment of the OHSC and the OHO's IT systems, with particular regard to the improved integration of data and opportunities for systems interoperability. The team then developed recommendations for establishing a Strategic Information

Unit, and conducted Business Impact Assessments leading to the development of a draft Business Continuity and Disaster Recovery Plan. The goal of these activities is to assist the OHSC/OHO to develop more robust and effective digital systems to support their work in improving the quality of care throughout the South African health establishments.

Jembi also provided technical assistance (TA) to the Quality Assurance Directorate of the SA NDoH, looking at existing patient experience of care and patient feedback systems in SA and the UK in order to provide recommendations on possible solutions to integrate these disparate data sources, enabling a more holistic view of quality of care across the country. Jembi also provided recommendations on designing digital tools for accessibility to ensure that ALL patients have the opportunity to provide feedback on their experience of care.

The third workstream focussed on a situational analysis of NCD data and source systems in order to provide recommendations and a conceptual system architecture to support integration of NCD data from a range of disparate systems.

" The goal of these activities is to assist the OHSC/OHO to develop more robust and effective digital systems to support their work in improving the quality of care throughout the South African health establishments.

Blood Safety Strengthening Programme Although Jembi's award winning Blood Safety Strengthening Programme (BSSP) through CDC came to an end at the end of September 2019, **the Blood Safety Information System (BSIS) continues to operate in five blood centres across Africa;** in Lesotho, Ghana, Zambia, Ethiopia and Cameroon. The implementations are sustainable and fully operational without Jembi technical support, demonstrating the value of a quality-assurance driven software development process and a sound implementation process based on international best practice guidelines.

The 6th implementation of BSIS is underway at the South Sudan National Blood Service in Juba, funded by the Swiss Red Cross. Initially planned for 2020, but put on hold due to the COVID-19 pandemic, the installation, training and go-live is now planned for mid-2021.

Programmes

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HQ Programmes Division

3. EBR: Child Healthcare

The first version of the Electronic Birth Record (EBR) has been delivered to the SA NDoH and will be trialled in Tshwane District by our partners at the UP/SAMRC Research Centre for Maternal, Foetal, Newborn and Child Health Care Strategies and CHAI.

The EBR is intended as the first component of a digital platform to support maternal, newborn and child care throughout the care pathway: from pregnancy diagnosis to the first 1,000 days of life.

EBR is a digital solution that is patient-centric and focussed on enabling the clinicians in the labour ward to provide better care by providing them with accurate and up-to-date information. Clinician-led data entry is a significant shift in workflows and the trial will evaluate how feasible it will be for midwives to record this data in a digital tool and whether the expected benefits of readily available information are realised.



The EBR will also provide babies with a unique identifier at birth and its own electronic record: currently newborns' patient records are included as part of the mother's record, leading to problems with monitoring mother-baby pairs over time. The system will also provide valuable aggregated data for monitoring and evaluation, planning and research purposes.

4. CDC Technical Assistance Programme in Ethiopia

Jembi has been working actively in Ethiopia as part of the CDC Headquarters Technical Assistance Programme (TAP) since October 2019 and harmonising this work with the ongoing work as part of a subcontract to ICAP in Ethiopia. Specific projects under the CDC HQ TAP programme include the delivery of project management and leadership training for both informatics and non-informatics professionals, development of a project management plan for a client registry application as part of the CDC Enterprise Performance Lifecycle and working with the local University of Gondar on localisation of the African Union Health Information Exchange Policy and Standards Framework. Linking in with the wider CDC HQ TAP programme, Jembi will also provide technical assistance for the delivery of a patient matching and linking service for the Ethiopia Public Health Institute. The core projects will be delivered during the current project phase and will continue on into a second phase during 2022.

As a buy-in for the CDC Technical Assistance Programme (CDC-TAP), Ethiopia is a strategically important country that is an early-adopter of the programme.

This prime award focusses on three core areas:

Capacity Development – Jembi is providing technical assistance to CDC ET to build capacity in a range of areas and skill sets to support the successful delivery of health information systems projects. Leveraging available CDC methodology and tools and adapting them for local use, Jembi delivered an online project management training course to over 50 participants in January 2021. Additional training courses aimed at digital health leadership for MOH and local partners, including universities, are planned to increase informatics capacity in Ethiopia.

HIE Policy and Standards – Jembi will lead the adaptation and localisation of the continental Policy and Standards for Health Information Exchange (HIE) of Africa CDC for use in Ethiopia, to produce a draft set of recommendations.

3 Client Registry – Jembi is evaluating options and making recommendations for an interim solution for the Client Registry component (the Master Patient Index or MPI). This component will enable patient matching and the deduplication of an existing data set consisting of casebased surveillance data for HIV patients in Ethiopia. Possible solutions for a long-term solution for a nationallevel CR/MPI will also be considered.

5. CDC Central Initiative

Jembi has been contracted to lead the DISI (Data Integration Strategies and Implementation) component of the PEPFAR-CDC TAP with the following goals:

Develop and implement sustainable HIS to enable advances in clinical care, patient monitoring, care coordination, programme monitoring and case-based surveillance.



Develop and support a community of HIS experts and practitioners that share resources, expertise, best practices, documentation and solutions across the PEPFAR community.

> **Develop workforce capacity,** governance structures, policies and guidance to support HIS.

DISI refers to the practice of centralising and integrating HIV data in a data repository for further reporting, analysis and visualisation. DISI enables healthcare professionals to effectively measure and monitor the progression and outcome of HIV through CBS sentinel events.

The DISI project aims to provide the following technical assistance to countries:

- Practical guidance or recommendations for integrating health data from different sources and jurisdictions; ensuring availability of quality data that is comprehensive, accurate, complete and timely; and ensuring the privacy, security and confidentiality of data for disease, case and programme management in order to enhance decision-making.
- Software applications or platforms with relevant documentation for enabling customisation and deployment, data standardisation, data integration and data use.
- Country implementation: Leverage DISI artefacts and/or processes to implement or improve data decentralisation for their use case.
- Process to monitor and measure potential benefits and risks of implementing DISI. Develop metrics to monitor and measure efficiencies.

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DISI enables healthcare professionals to effectively measure and monitor the progression and outcome of HIV through CBS sentinel events.

The DISI project started on 15 September 2020 and, as of the time of writing, Jembi has contributed to the completion of both the rapid landscape assessment for five OpenMRS PEPFAR Collaborative (OPC) countries and the first draft documents for a conceptual DISI architecture (including functional and non-functional requirements).

The next phase of the project includes the finalisation of the requirements, the design of a Patient Identity Toolkit for patient matching and linking, and the development of an MVP for data centralisation with an analytics and visualisation component. The project also includes the Global Informatics Collaborative (GIC) Sandbox, which is a collaborative environment to assist country implementers in creating digital health solutions using artefacts created by the CDC HQ Technical Assistance Programme (TAP).

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6. RAD Connectivity Box

If nothing else, the COVID-19 pandemic has brought to light the dire state of global public health systems. It highlighted the lack of online stock and asset management, raising questions like: "Where are the respirators?", "Where is the PPE?" and "Where are the health professionals?". It also revealed the lack of basic infrastructure needs, particularly in emerging countries, which severely impacted the ability of these countries to adequately respond to public health requirements during the pandemic (not only for COVID-19 patients, but also for other health-related issues like infant immunisation, pregnancy check-ups and diabetes, to name a few).

Often, ICT infrastructure within rural clinics is not functional – having been installed through donor organisations with little alignment to national governance or priorities, and addressing a single vertical issue. The equipment, mostly consisting of desktop PCs and printers, is complex to maintain and cumbersome to use (it is usually situated, for security reasons, in a locked room without adequate ventilation or the setup needed to see patients). Furthermore, the equipment normally requires mains electricity (and a lot of it), competing with other electrical equipment (such as fans).

These infrastructure issues are well-known and documented as barriers to entry for digital health solutions, usually cited as the reasons for programmes failing (e.g. there being no connectivity or no constant electricity).

With years of experience of development and implementation in Africa, Jembi has gained sufficient insights into the domain of digital health, including an understanding of the causes behind solutions that are not adopted in Africa. In response, Jembi has developed solutions that, by and large, mitigate the above-mentioned problems. These solutions provide core technologies to enable digital health solutions, particularly in rural areas where service delivery is generally at its worst.

By bringing together lessons learnt in the RAD programme, appropriate technologies and technology specialists in certain fields, Jembi has developed a platform, OPEN HORIZONS specifically to support the work being done in the RAD project, but also as a core technology that can enable other health services in technology constrained regions. It is designed to support multiple digital health solutions in a sustainable and robust manner.

OPEN HORIZONS is a hardware platform that has been designed to take into account the harsh environment into which it will be installed. In its fundamental form, it is a "server-in-a-box", but so much more.













Besides having two servers that act together as one, OPEN HORIZONS is also able to be powered from its own solar panels – as a secondary power source or for cases where mains electricity is not available. It has its own batteries, allowing ongoing service for up to eight hours with no mains and no sun; it is maintenance free.

To ensure patient information is safely stored, the platform also contains connectivity components that allow the unit to upload patient information to central servers in the event of a system failure or when patients move between clinics. The connectivity is modular and can be based on mobile technology (GSM) or on newer technologies such as the recently announced Starlink satellite system – provisioned to be available in 2022.

Instead of power-hungry PCs with monitors and printers, Jembi has based the technology on mobile devices such as robust cell phones, tablets and Chromebooks – cost effective in terms of energy, efficiency, maintenance and support.

OPEN HORIZONS is a concept and solution developed by Jembi Health systems – a non-profit organisation based in Cape Town, South Africa. The concept has been designed to address the issues experienced by implementers of public health solutions particularly in Africa, but it may also be applicable to other areas of the world.







The following issues are addressed by OPEN HORIZONS:

Access to clean power

Although mains electricity may be available through power utilities, the power supply is not stable and constantly leaves households and industry "in the dark" for extended periods. Mains-powered solutions can therefore not be relied on, and when dealing with health, turning patients away is not an option. As a result, fall-back solutions such as pen and paper are used, meaning that recordkeeping and archiving becomes an incredibly laborious task, with little to no value to the patient, the health provider or the ministry.

Access to the Internet

Although GSM technology is commonplace in Africa, bandwidth restrictions limit the type of communications that can be implemented, particularly in sparse rural settings where GSM base stations are far apart and highly congested. Health systems that rely solely on GSM to store and retrieve patient information run the risk of leaving health workers with no access to records when needed the most. As a result, health workers fall back onto alternative means of record keeping such as pen and paper (as with power issues), and again, create a burden of additional work and administrative tasks that add very little value to patient support. Programmes

HQ Programmes Division







Access to technical support

When technology-reliant solutions are implemented in rural settings, care must be taken to ensure local skills and spares are available to ensure the technology can be sustained. More often than not, technology that is single sourced is implemented in rural settings that rely on special shipments from foreign countries when parts are required. The cost and the time required of such single item imports, transportation logistics and local support skills become unsustainable, and as a result, such equipment eventually becomes unusable – usually being packed up and stored in a box in a cupboard.

Access to indicators, aggregated data and patientlevel data

For ministries to make decisions, access to information is of prime concern. The information, however, needs to be as current and accurate as possible. When this information is manually captured in registries, it has to regularly (physically) be delivered to depots in batches. It is then collected and dispatched to the ministries, by which time the information is typically incomplete and dated, with the ministry left unable to re-acquire the correct information.

OPEN HORIZONS – an enabler in a box.

Making use of standard, off-the-shelf modular components is part of the Jembi design strategy – for software as well as for hardware. To this end, very few of the components within OPEN HORIZONS are bespoke or specially built for the solution. These components are well-supported and usually available in most countries in Africa. Where these are unsupported or unavailable, Jembi is able to source these components locally and ship within Africa at affordable shipping rates. Within countries of free trade agreements, the cost of importing is substantially reduced.





To further reduce support costs, Jembi's intention is to provide the OPEN HORIZONS technology in kit form to participating institutes. Training and support will be provided to these partners, allowing these partners to assemble, maintain and support the OPEN HORIZONS solution in the country – supporting local skills development and reducing support costs. The OPEN HORIZONS technology will also allow ecosystem partners to adapt and extend the solution with the aid of Jembi where necessary to cater for additional services.

Addressing stakeholder needs

By developing such ecosystems, the total cost of investment for the lifecycle of the solution is substantially reduced.

To further support additional health solutions within a clinic, the embedded servers are able to support multiple applications, each application being able to have their own access control (managing who can see the data), database and backup policies. By sharing the hardware services, these applications can independently back up or archive their data to remote or centrally hosted platforms. For administration of the solution, administrators can create and remotely download scripts that are able to be run on the servers and report back information. Typically, these scripts would be developed to provide periodic diagnostics reports.

To assist administrators, Jembi has developed a central platform for those not wishing to develop their own. Journey Central is a portal through which registered administrators are able to synchronise their OPEN HORIZONS data "in the cloud" as well as monitor and manage the installations remotely. As the network is based on GSM, which is at best patchy in these locations, direct login to the remote sites is not encouraged, as this will not only consume large amounts of mobile data, but will most probably continuously drop connections. To mitigate this, Jembi has developed an administrator's "In-box" and "Out-Box". When an administrator wishes to run a diagnostics programme or another remote service, that administrator uploads the script that needs to run onto the portal for a specific server. Periodically, that server will synchronise its in-box, download the script, automatically run it, and report any information to that server's outbox – available for the administrator to access.

Sustainable architecture is a design criteria Jembi used to develop the solution and provide in-country skills development to support OPEN HORIZONS. With our first partners already being trained in Kenya, the strategy is to provide these teams with training material and technical support as needed. It also provides an opportunity to extend the solutions where necessary and add additional innovative components to the ecosystem. The platform should be seen as a digital health enabler, capable of being adapted and configured for rural clinics needing to transform their paper-based patient records into a sophisticated data capturing tool across all health interventions – support for immunisation, NCD, HIV, TB, etc.

In addition to impacting patient health, the architecture allows other stakeholders to benefit from OPEN HORIZONS connectivity features:

- Support and maintenance crews can receive near real-time operational information to ensure timely repairs and support.
- Decision-makers within health ministries are able to access patient-level data, and run statistics to determine the impact of programmes, stock levels, intervention loads and much more.
- Administrators can update server and mobile applications on a per-clinic level when necessary.





Programmes

HQ Programmes Division



What's in the box? The OPEN HORIZONS unit consists of:

- All the necessary power management for either mains or solar power sources.
- Dual redundant servers are synchronised to Journey Central remote storage and running Ubuntu Linux.
- Charging stations for the provided mobile devices (handset or tablet options).
- Wi-Fi hotspot management which allows only the provided handsets or tablets to access important information.
- GSM connectivity modules to connect the solution to Journey Central through the internet.

Internally, all components are managed and communicated through an internal ethernet infrastructure. The internal router manages and limits access to the internet, provides the setup for the Wi-Fi access points, and ensures all necessary components and applications can communicate through the provided channels either to each other or to the internet. Where necessary, dual (or redundant) communication channels could be implemented (a second GSM module or a satellite service) with minimal configuration or setup.

If additional servers are needed, the solution can scale to support this. Increasing the number of ethernet ports and adding additional power to the solution can be achieved in the field or on a unit swap-out basis – but all handled in the country with no need to ship expensive consignments back to Jembi.



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Looking back ten years, a similar solution would be at least ten times the size and weight of OPEN HORIZONS.



Shipping and packaging of the OPEN HORIZONS solution is designed to be robust and survive multiple shipping channels (as required in getting such solutions to the rural clinics). The advancement of technology has seen the reduction in space and weight in such solutions. Looking back ten years, a similar solution would be at least ten times the size and weight of OPEN HORIZONS. By tracking technology and regularly upgrading the design, OPEN HORIZONS will continue to reduce in size, cost and weight, making deployment and shipping simpler and less costly. All the required parts, such as the GSM antenna, Wi-Fi hotspots and other mounting parts are incorporated in the shipping and packaging. The only component not included is the solar panel as these are available in most countries through third party installers. It is therefore not necessary that these be supplied, especially considering that it would increase the costs of shipping and importing. Local installers are also required to install the solar panels on the roof of the building, and since most of these installers also provide solar panels, it is more pragmatic to allow these installers to install and support their own products (of which there are numerous in African countries).

Component certification

All components are carefully selected and have the required regulatory certifications as governed by international bodies. The certificates for all appropriate components and modules are available on request, however a summary of regulatory certificates per module is provided herein. Tracking with Recency Assays to Control the Epidemic (TRACE)

Jembi continued to provide ICAP with technical assistance on TRACE initiatives throughout 2020/2021. There were four key focus areas during this period:

TRACE modular curriculum Development and delivery of a tailored training programme, focussed on the design, development and implementation of TRACE-specific solutions.

Upgrade of openMRS in Rwanda Provision of technical assistance to the in-country ICAP team upgrading openMRS at ICAP supported facilities in Rwanda.

TRACE DRC solution design and implementation:

- Provision of technical assistance in systems identification, solution architecture and implementation of TRACE programme in the DRC.
- AWS-hosted implementation of OpenHIM and mapping mediator.
- Continued technical assistance in TRACE countries where solutions have already been implemented (Ethiopia, eSwatini and Lesotho).

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8. Journey Immunisation Programme in Kenya and Uganda

Currently being piloted on the Kenya/Uganda border in four clinics, the JOURNEY Immunisation programme has processed over 140 000 events from over 14 000 patients and has had less than 20 hours total down time since its inception in September 2018. The programme has been able to track patient patterns from both countries across the border without compromising any identifiable information. The current retention rate of patients on the Journey Immunisation Programme is over 97%, a significant number for the adoption of any programme.

We believe that the reason for such a high acceptance and uptake lies both in the governance provided by stakeholder parties and in the end-to-end design, which substantially reduces the workload of healthcare workers and takes patients' needs into account (important criteria in change management).

For patient engagement, JOURNEY is a branded Starter Pack based on commonly seen Mobile SIM starter packs and accepted throughout the region. The branding is carried through to branding and product awareness within the clinics. This allows patients to easily identify services in any region, knowing that their identity is safe and that their infant's immunisation record is up to date.

Journey is based on plastic cards that use contactless payment technology, like those found in banking, security, and public transport systems worldwide. Jembi has repurposed the technology to be able to carry, in electronic format, the complete immunisation history of an infant on a cost-effective plastic card. Equipped with a mobile device, health workers are now able to issue and update immunisation events for an infant without needing connectivity to go online or having to complete timeconsuming paper registries or tally sheets.

For the caregivers, the cards offer a durable, robust, and easily stored alternative to paper-based systems. In addition to storing the immunisation information on

Healthcare Worker Card Summary		
Current Cards	Total	
Activated	6	
Registered	5	
HCW Administrators	3	
Used for Vaccine Events	16	

Child Card Summary		
Current Cards	Total	
Registrations to Date	2207	
Replaced	0	
New Registrations	2207	
Visiting Caregivers	4	

Vaccination Event Summary		Retention Events	Visitor Events	Retention Rate
Code	Total	Breakdown Total		
BCG	2168	2168	0	100.00%
DPT-Hep-Hib	2896	2891	5	99.83%
MR	784	782	2	99.74%
OPV/IPV	5038	5033	5	99.90%
PCV	2842	2837	5	99.82%
ROTA	1957	1954	3	99.85%
VITA	1288	1284	4	99.69%
YF	664	663	1	99.85%
Grand Total	17637	17612	25	99.86%

The JOURNEY solution frees up about eight minutes of health worker time per patient in processing, documenting and other administrative tasks associated with the service.

the card, all transactions and events are also archived in the cloud. If a patient requires a replacement card, they can apply for it by simply presenting one of four QR code stickers provided inside each starter pack. The card can then be quickly and easily provisioned by the health worker with a new starter pack.

The JOURNEY solution frees up about eight minutes of health worker time per patient in processing, documenting and other administrative tasks associated with the service. For ministerial and operational stakeholders, regular reports on a variety of data can be generated. Currently the system generates weekly reports that provide insights into the number of patients seen, the number of specific immunisation events, the number of returning patients, the number of patients seeking services across borders, the number of health workers using the solution, and the average daily start and end times. The information is presented as weekly, monthly, or as trending information on each clinic individually, per country or as a whole solution.

The current system is being upgraded to allow a near realtime view of data in addition to more operationally vital information – for example the state of the mobile device batteries, so that decisions around replacements can be made ahead of time.

JOURNEY relies on a connectivity box installed in the clinic. The connectivity box ensures that all mobile devices are charged, have Wi-Fi connectivity and that data is locally stored and archived. The box is powered by both solar and mains electricity and is capable of working with no electricity for over 10 hours when fully charged.

KY1 KY2

1-7



15-21

22-28

Mar

29-31

Mar

8-14

Vaccination Events Summary: Oral/ Intramuscular Poliovirus vaccine



Caregiver Card Events: New Registrations



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9. HealthConnect App Store

Mobile Health (mHealth) has the potential to assist in strengthening health systems and service delivery across low resource health settings, particularly where reliance on community-based health workers is increasing. This has resulted in significant activity and a substantial number of innovative solutions to address the management and implementation challenges in deploying mHealth solutions effectively and sustainably. However, mHealth solutions will only reach their full potential if they become part of the formal public health sector and are endorsed by the Ministry or National Department of Health (NDoH).

As a result, Jembi Health Systems was contracted to develop an App Store for the National Department of Health. The second phase of the project was focussed on strengthening the App Store and the App Store portal to ensure that all



the apps within the App Store are specially developed and supported to ensure health workers can find the apps they need and receive the same standardised information that is curated by their department of health.

The download process and workflow was enhanced and a new UI was designed to improve the user-friendliness of the App Store interface, making it resemble competitive App Stores. The reverse billed port and billing tracking were implemented. The App Store portal was then strengthened to include the creation of organisations, apps and users to track indicators and monitor apps developed for and published in the NDoH App Store.



10. MEN CONNECT

MenConnect is a mobile platform that provides highly personalised information, advice, and reminders for men on their HIV journey. The focus is on awareness, testing, initiation and adherence support, with an overall aim to improve ARTinitiation and adherence in men living with HIV (MLHIV). The MenConnect platform is being developed with funding from Gilead Science Inc. by Praekelt, with support from Genesis Analytics and Jembi. Jembi's role in MenConnect has been to develop a data integration and analysis solution, supporting an architecture that supports data exchange and interoperability outthe-box. The solution developed includes the use of the Open Health Information Mediator (OpenHIM) and **District Health Information System** 2 (DHIS2) as an analytics platform. The OpenHIM functions as an interoperability and data exchange layer, supporting the mapping and transformation of incoming data from the MenConnect mobile platform, along with the submission of this data to DHIS2, which is used for reporting of treatment- and adherence-related indicators.

11. CareConekta

In September 2017, Jembi established a collaboration with Dr. Myer from Vanderbilt University Medical Centre, Ms. Phillips from University of Cape Town, and Dr. Camlin from University of California San Francisco on a proposed National Institute of Mental Health R34 project, "CareConekta: Mobile health for a mobile population."

The scope of work consists of three components:

- Firstly, the development of a mobile app that periodically gathers location coordinates through the smartphone's built-in GPS information system. The app then transfers this data to the native Android platform so that it works with any Android device.
- **Secondly**, a back-end was developed so that the storage of sensitive participant information is in line with best confidentiality practices.
 - **Thirdly**, we provide monthly hosting and services.

The information is stored within the Jembi server infrastructure, with a log-in ability for stakeholders to extract GPS locations when required. The solution is based on a notification service developed by Google (called FireBase), which periodically sends a GPS location request to the CareConekta application installed on the user's device.

The project has been operational for almost one year, with approximately 100 participants from the Khayelitsha area in Cape Town.



CareConekta Logo as displayed on the CareConekta mobile application.

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The project has been operational for almost one year, with approximately 100 participants from Khayelitsha in Cape Town.

12. Sesikhona Project with the Africa Health Research Institute

In March 2018, Jembi and the Africa Health Research Institute (AHRI), based in KZN, collaborated on a project similar to CareConekta – also to track HIV patients. However, this project was different to CareConekta in that it had a much finer focus and a different research question. In addition, Jembi collaborated closely with the AHRI data science and ICT teams in developing a mechanism to ensure patient information was only hosted on the AHRI servers in the AHRI data centre, with operational data being available to Jembi for monitoring purposes (without compromising patient information at all).

Jembi developed a mobile application to securely track the GPS locations of the users that consented to this and report the information gathered.

For the ARHI solution, Jembi re-engineered the CareConekta architecture to remove the reliance on the Google notification engine – it would be able to work when devices are offline or out-of-range for Wi-Fi. It collects information securely every 20 minutes, and stores that information on the user's phone until connectivity is re-established.

Jembi worked closely with the AHRI ICT team to see if a mechanism to optimise data transfers was possible.



AHRI's Sesikhona splash screen and registration screen as displayed on the Sesikhona tracking mobile application.

12. Sesikhona Project with the Africa Health Research Institute (Continued)

In collaboration, an architecture was developed. It provides the following security features:

- Patient demographic information is never available through the Jembi data flow – neither in plain nor encrypted text.
- Patient identifiable information is encrypted when it passes through Jembi infrastructure to AHRI infrastructure and is not stored on any Jembi servers once the data reaches AHRI.
- The data that is stored has no patient identifiable information or any metadata that could be used to trace the data back to the mobile user – even if the data is in the clear.
- Data relating to the user's operational information (type of phone, version, battery status, last cell tower, etc.) is stored on the Jembi servers, but can't be traced back to a user, their cell phone, their SIM or their patient ID from anyone – except those at AHRI who are able to cross-link a unique "asset ID" with the "patient ID". (even though Jembi has the "asset ID", there is no data within that record that could be used to retrace the identity of the user).

This true separation of operational and health information allows the client (AHRI) full access to tracing user identities, whilst giving absolutely no ability for Jembi (or anyone else for that matter) to retrace patient identities. It is a recipe that can be implemented in other instances

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where Jembi is required to handle, process and manage confidential client information.

A summary of the sequence diagram developed for the registration process and the "reporting home" function is provided below. The mobile application is able to cater to users that change their devices, swap their SIM cards or change mobile operators, without the intervention of a researcher or the need to contact a call centre.

The researcher also has clean, searchable data that is not cluttered with additional metadata – they do, however, have the ability to access that metadata as required (if a user's application stops, for example).

Sesikhona is on track to be implemented at the start of mid-2021 in KZN. We look forward to reporting results of the projects in forthcoming reports.



Jembi is working with ICAP Ethiopia to create specifications, set up project teams and assist with development of a Central Data Repository (CDR) with reporting capabilities for ART patients.

The project aim is to create an automated end-to-end process for collecting data from SmartCare EMR enabled sites and using it to create standardised reports. Jembi's involvement is to create the system architecture and assist with the development of the CDR system. This project will continue to run into 2021.



The project aim is to create an automated end-toend process for collecting data from SmartCare EMR enabled sites.

14. EMR development in Cameroon

As part of strengthening Cameroon's strategic information system and in order to accelerate the computerisation of hospitals as stated by the Prime Minister, the Ministry of Public Health has, with its technical and financial partner CDC, undertaken the customisation and development of an electronic medical record (EMR).

Since 2017, feasibility studies have been carried out by ICAP Columbia University. The Cameroon office was responsible for supervising the pilot phase, with technical support from MoH and NACC. This was continued in 2018 by the University of California San Francisco (UCSF) and the University of Washington (UW), in continuity with the Cameroon HIS Landscape Assessment. This led to the creation of a consortium by CDC for the implementation of HIS in Cameroon. Jembi Health Systems has for this purpose been assigned to assess and ensure the development of this EMR.

To do this, an evaluation was done with the key stakeholders at HD Deido and HD Cité Verte in order to better understand the existing system.

The following functions were developed to mitigate the shortcomings:

- Patient registration
- 2 Appointment scheduling
- 3 Open and close visits
- Enhance the usability of HIV adult and infant forms
- 5 Add lab orders and review results
- 6 Prescriptions
 - HIV programme management
- Selected indicator reports of the 52 Prioritised List provided by MoH, NACC and CDC

Jembi has carried out technical requirements and conducted UAT in order for the user to validate their requests. From 2019 to 2020, Jembi has released nine versions of the EMR, based on feedback from end-users and technical specifications from MoH and NACC.

These releases included:

- HIV programme management
 - Patient registration;
 - Enrolment into programmes (HIV, TB, etc.);
 - HIV Patient tracking.

Synchronisation with the clinical service.

Clinical assessment, including:

- Recording of observations:
 - Chief complaint; adult initial assessment and FU patients; HEI consultation;
 - Paediatric management; pregnant women management.
- Diagnostic:
 - Integration of ICD10 and conditions in the diagnostic tab.
- Orders management:
 - Orders for VL test, CD4 count, and any other lab test to an HIV patient;
 - Reorganise tests into department, sample type, etc. in order to make the system user-friendly;

- Medication:
 - Prescribe and dispense ARV and other drugs to HIV patients;
 - Manage paediatric dispensation and order set dispensation;
- Appointment management for HIV patients;
- Default tracking for patients that missed their appointments;
- Index testing and contact tracing;
- VL monitoring and EAC management;
- Community base dispensation; Reports (CDC/PEPFAR; MoH);
- IPT management.

Laboratory management

- Sample collection for VL, PCR and other lab tests from CMR Lab;
- Referral management for VL and PCR to reference laboratory;
- Management of lab test results and validation;
- Report generation.

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14. EMR development in Cameroon (Continued)





In addition, Jembi supported Training of Trainers to MoH IT unit staff, NACC IT and regional staff, Georgetown University (GU) technical and clinical staff, and UCSF staff on the use of the EMR. Jembi supported two rounds of online training to GU staff and developed a set of training material and job aids on the use of the EMR.

Moreover, Jembi supported four days on-site training to Cite Verte and Deido end-users; three days training on the use of EMR to GU and NACC RTG staff in the East region; three rounds of five days training to GU staff using Zoom during the COVID-19 meeting restriction period; four rounds of three days training in the Health facilities in the Center and Littoral region; four refresher training sessions for the EMR user at Deido District hospital and the East region.

In addition to the supported training sessions, Jembi provides mentorship to the health facilities supported by NACC and Georgetown University.

Finally, in order to ensure sustainability of the EMR implementation and development, Jembi worked with MoH, NACC and Cameroonian universities for capacity building and to develop curricula for students to understand and develop the Cameroon EMR.

Country Health Information and Data Use (CHISU)

Jembi is a core partner on the Country Health Information and Data Use (CHISU) project led by John Snow International (www.jsi.com). CHISU is a flagship data and information system project funded by the USAID Bureau for Global Health, Office of Health Systems.

The project aims to strengthen host country capacity and leadership to manage and use high quality health information systems to improve evidence-based decision-making. JSI leads the project, in partnership with Jembi Health Systems, RTI International, Vital Strategies, Macro-Eyes, and Global Evaluation and Monitoring Network for Health (GEMNet-Health). The project started in 2020 and focussed on startup work during the first period. This included defining the key outcome indicators using the HIS Stages of Continuous Improvement (SOCI) toolkit. The consortium also convened a number of workshops to define Learning Objectives and a CHISU Theory of Change.

These will be useful for the development of projected country activities for the coming years of the project. Jembi has also worked with JSI to propose a regional interoperability lab for possible funding by USAID.



Jembi is one of the founders and leaders of the Open Health Information Exchange (OpenHIE) international community. Jembi is responsible for the interoperability layer and shared health record communities and is a leader of the OpenHIE Implementers Network (OHIN). Jembi provides support for the Data for Accountability, Transparency and Impact (DATIM) reporting system, which makes use of the OpenHIM for submitting data to a central reporting system.

2020/21 Key Activities

OpenHIE 2020-05-28: CC BY 6.0

- Under the banner of Leadership and Advocacy, Jembi continued to engage and lead in the leadership and architecture communities of OpenHIE.
- Jembi continued work around the broader Community and Reference Tool Curation, where it curates the Interoperability Layer (IOL) and Shared Health Record (SHR) communities, and maintains the OpenHIM as an Interoperability Layer reference technology.
- Collaboration with international teams in providing DATIM Support to the DATIM development project, which utilises Jembi's OpenHIM tool.
- Jembi continued to curate the OpenHIE Implementers Network alongside the Regenstrief team.

- Continued releases of the OpenHIM software.
- Participation and leadership in the OpenHIE DevOps and Health Financing towards UHC communities.
- Participation in international meetings and conferences presenting on Instant OpenHIE, and the OpenHIM, and its role as an interoperability layer in a Health Information Exchange.
- Participation in the OpenHIE Academy community, with the goal of orienting learners to the essential concepts and competencies needed to understand the role of OpenHIE.

17. OpenHIE COVID-19 Data Exchange

Jembi has been participating in the OpenHIE COVID-19 task force to support community efforts to identify and collate information relating to data standards and exchange relevant to the COVID-19 response, and to see how to best adapt and support use of Jembi-supported tools such as the OpenHIM and Instant OpenHIE to respond to COVID-19.

Through funding from Digital Square, Jembi has been working on a project to adapt and leverage the OpenHIM and Instant OpenHIE in order to support the exchange of COVID-19 data within a health information exchange. Through this, Jembi is promoting the use of open source software and standards to support countries' digital health ecosystems in response to COVID-19.

The scope of work is focussed on COVID-19 case reporting and submission of lab results. This supports the ingestion of case report and lab data, and the persistence



of both a FHIR data repository and DHIS2. It is aligned with the World Health Organisation's case report form and use of the HL7 FHIR data exchange standard.

The OpenHIM has also been added to various lists, highlighting adaptations

of global goods to address COVID-19, including Digital Square's COVID-19 Map and Match tool, UNICEF's partnership mapping of relevant digital technologies for the COVID-19 response, and the UNDP Global Centre's COVID-19 Open-Source Digital Toolkit.

18. Instant

The Instant OpenHIE project is funded through an investment from Digital Square, with the aim to reduce the costs and skills required for software developers to rapidly deploy a reference OpenHIE architecture. Thereby, the project provides a simple way for technical persons to set up a reference Health Information Exchange (HIE), supporting real-world use cases and allowing users to illustrate how interoperability can work to solve various health challenges.

Instant OpenHIE aims to provide for:

Easy demonstrations of key workflows using an HIE based on the OpenHIE architecture.

- Hands-on and practical training.
- Reduced costs and skills required for software developers to deploy an OpenHIE architecture for quicker initial solution testing.

Jembi has partnered with IntraHealth International to work on Phase 1 and Phase 2 of the project. Phase 1 focussed on a health workforce use case and the development of component packaging, scripting and containerisation to produce a packaged version of the OpenHIE architecture, comprising a set of HIE reference technologies and other appropriate tools. In Phase 2, Instant OpenHIE is being extended to include support for new use cases, workflows and technologies. It will also include core architecture and packaging refinements, an updated user interface and test harness architecture, dedicated support for the Instant OpenHIE user community and improved user documentation.



Jembi has continued to strengthen and maintain the OpenHIM product offering through various investments.

Jembi continues to develop and strengthen the OpenHIM product offering as the reference technology for the OpenHIE Interoperability Layer. This is done with a focus on core enhancements for improved performance and security, and on improved mediator capabilities and support for standards such as HL7 FHIR.

The 2020 roadmap included improvements to containerising and orchestrating deployment of the OpenHIM, routing engine refactoring to allow for optimisation of transaction handling and processing towards improved performance, improved development and deployment of OpenHIM mediators, and improved support for the HL7 FHIR data standard in line with the increased maturity of FHIR and adoption within the OpenHIE community.

Jembi also provides ongoing support for OpenHIM implementations and the user community, including updates to OpenHIM deployment processes and end-user documentation, along with a support channel and tutorials – allowing implementers to more easily and effectively set up, configure and maintain their instances of the OpenHIM. Jembi continues to develop and strengthen the OpenHIM product offering as the reference technology for the OpenHIE Interoperability Layer.

In 2020, Jembi attended the virtual Global Digital Health Forum and gave a presentation on the OpenHIM.

20. Electronic Medicines List (EML) Guide



The EML mobile app presents the Primary Health Care Standard Treatment Guidelines, Hospital Level Adult Guidelines, Tertiary and Quaternary Level EML Recommendations and Essential Medicines List. It includes a searchable list of the latest guidelines, decision-support tools and a directory service. Essential medicines are those that satisfy the priority healthcare needs of a population.

The HealthConnect Content Management Tool (CMS) is used to curate and update the content for the EML app. Content is added to the CMS, reviewed and then published in a new version that is automatically accessible by the content-driven applications. Jembi worked closely with the Essential Drugs Programme of the Affordable Medicines Directorate in order to review and



validate the content on the CMS. The application is currently live and available via the Google Play Store and the NDoH App Store.

Our growth has been good, with almost 2500 active users/devices – you can see the growth pattern below. We're averaging 80 new users a day.

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Photos from the UAT sessions with users at the immunisation clinic at Bilira Health Centre.





Left: A health worker uses the Emmunise module in real-time during the UAT session at Bilira Health Centre.

Below, from left to right: All Children immunisation list; doses required for the village; children due for immunisations.



21. GIZ Malawi Emmunise Project

GIZ (German Agency for International Cooperation) has an innovations fund with the objective of increasing efficiencies through innovation. Innovative ideas that engage with current topics are submitted to GIZ from around the world. The Emmunise concept was selected for funding through the GIZ Innovations Fund in late 2019. Jembi contracted Ona to develop the Emmunise module.

GIZ approached Jembi Health Systems for assistance with the development, implementation and roll-out of the enhanced immunisation module for vaccination outreach services.

The enhanced immunisation module is aimed at facilitating easier preparation and implementation of mobile vaccination services, tailoring it to the specific

demands of outreach service delivery by providing the following functions:

- Generate lists of children due for vaccination in a specific catchment area.
- Ensure that the correct amounts of the necessary vaccines needed for the outreach session are packed, using an automatically generated list.
- Identify children who did not receive necessary vaccines so that they can be followed up on to ensure they receive their vaccination.

The project is currently on track to implement the Emmunise application at Bilira Health centre in March 2021.



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22. GIZ Malawi eRegister Project

Jembi was contracted in 2019 by GIZ Malawi to provide support in the strengthening of health systems related to reproductive and maternal, newborn and child health (MNCH) in health facilities in Malawi. This is done by promoting data analysis, interpretation and use through the customisation and implementation of an electronic register system, OpenSRP. The child health module was delivered in the previous period of the project. The ANC, Maternity and Postnatal Care modules were implemented in Bilira Health Centre in September 2020. All modules delivered inapp daily reports and integrated aggregate reports to DHIS.

Antenatal Care (ANC)

The ANC module tracks the attendance of ANC clinic visits, as well as household visits by a community health worker at the community level. This module follows the World Health Organisation's new ANC guidelines.

Maternity and Postnatal Care

The maternity module allows the healthcare worker to capture the delivery details. The maternity record is linked to the ANC record and the child health record. The system provides decision support and reminders for healthcare workers to support women who



have recently had their baby. The app collects information about infant feeding practices, malaria prevention, early childhood developmental milestones, possible birth defects, and immunisations that are due. It also supports the healthcare worker to monitor possible danger signs to look out for in terms of the mother's health.

23/ EmptyBoxes project

The EmptyBoxes project is funded through an investment from Digital Square, and focusses on adapting and extending the core Instant OpenHIE solution to support a clinical package, with scripts to setup a containerised set of components and configuration scripts enabling management of clinical data in a Health Information Exchange (HIE).

The project is based on a pilot use case for clinical data exchange between the core Instant OpenHIE platform and CommCare as a point of service mobile application, supporting a set of standards-based clinical data exchange workflows aligned with Integrating the Healthcare Enterprise (IHE) profiles and HL7 FHIR data exchange standards to allow for reuse across other use cases and applications.

Jembi has been working on developing a set of OpenHIM mediators to support the required workflows, extending Instant OpenHIE to support a Client Registry component and packaging of the workflows, data interfaces and persistence of clinical data, along with user documentation to support general use of the Instant OpenHIE Clinical package.

24.

Child Healthcare Problem Identification Programme (Child PIP)

Child PIP is a mortality audit tool designed specifically for infants and children. The Child PIP team uses the information gathered from careful mortality reviews to improve the quality of care that sick children receive in the public health system, thereby reducing child mortality. During 2020, Jembi continued to redevelop the existing Delphi/MSSQL Server Express application in a modern programming language. This work will support the programme's long-term sustainability by making it easier to implement, operate, maintain and upgrade the software.



The Child PIP team uses the information gathered from careful mortality reviews to improve the quality of care that sick children receive in the public health system, thereby reducing child mortality.

25.

SAMRC - Jembi Collaborating Centre for Digital Health Innovation (CCDHI)

The Jembi SAMRC CCDHI project reached the end of its initial three-year period at the end of March 2021 with a number of notable achievements. One such achievement is the development and implementation of an AppStore for the NDOH's Affordable Medicines Directorate (AMD), along with a content management system linked to the Essential Medicines List (EML). At the time of writing, the EML system is available for download by registered users.

Jembi participated in several other SAMRC activities, including the Precision Medicine Initiative. Some of the activities planned by the CCDHI were negatively impacted by the COVID-19 pandemic, and an application has been made to SAMRC to continue the work as part of a no-cost extension period.

26.

African Health Information Exchange (AHIE)

The AHIE is a core Jembi project that aims to strengthen and mature the use of a health information exchange with the Western Cape Provincial Department of Health (PHDC) and nationally in South Africa. The project is funded by the Bill and Melinda Gates Foundation (BMGF) and is led by the University of Cape Town School of Public Health and Family Medicine (UCT-SPHFM). Other collaborators include the South African National Department of Health (SA-NDoH), Jembi Health Systems, the National Health Laboratory Service (NHLS) and Health System Technologies (HST).

During the final period, the Open Integrated Health Platform (OpenIHP) was released to users. This platform integrates SPV with the TIER.Net platform which is used nationally in South Africa for the integrated management of HIV and TB patient and treatment information. The packaged solution provides the ability to capture data in an offline mode and to visualise the data.

The team continued to develop two open technologies, the Open Integrated Health Platform and the Open Local Health Information Mediator (OpenLHIM), which are being implemented as part of the Western Cape Provincial Health Data Centre (PHDC).

In addition to technical development inputs, Jembi also contributed to the COVID-19 pandemic tracking and tracing initiatives, re-prioritising planned functionality to make space for the much needed Outbreak workflow. With the introduction of the Outbreak workflow, the number of users, clinicians and others has dramatically increased.

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27. CDC Cameroon COAG

In Cameroon, routine data collection, analysis and subsequent reporting on HIV/AIDS programmes and PMTCT/MNCH have been a major challenge. Examples of these challenges include: the follow-up of clients from testing to the ART initiation clinic; reporting of indicators (Understanding of indicators by healthcare workers); and monitoring of linkage within the facility and across health Facilities and Control of duplication of records.

In order to address these challenges, CDC/PEPFAR, through NACC, MOH and its implementing partners, have introduced the design and the implementation of an EMR based on the OpenMRS platform. Since 2020, the partner GU is supporting the implementation of the solution for PEPFAR, reporting in the EAST region in their 19 health facilities. Jembi has assigned a specialist at HP Garoua Boulaï in order to provide support for the better use of the EMR at the HF.

As part of the support provided, The Jembi EMR Specialist

and his colleague from GU reviewed the Implementation

and data flow/circuit with role and responsibilities of stakeholder engaged in the use of the EMR at Protestant Hospital Garoua Boulaï (see diagrams below).

In order to provide more support and ensure good data quality, the Jembi EMR specialist with the support of GU data associate and data clerk conducted daily data review and provided feedback to the data clerk in charge of data entry in the EMR. At the end of each day, the team makes sure to correct all data quality issues and completeness checks and send feedback to Jembi for any bugs reported. As far as some data issues are raised, the EMR specialist organised a series of onsite refresher training to highlight completeness issues and prevent other quality issues. In addition, the EMR specialist organises weekly sessions to refresh the data clerk on the best use and on good practice.

With Jembi support to GU, joint efforts to monitor EMR activities improved completeness and quality of data at HP Garoua Boulaï as presented in the figure below.



Screenshot of the EMR implementation and Data flow/Circuit at HP Garoua-Boulai.



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EMR Completeness status for HP Garoua Boulaï.

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28. Women Social Impact Bond

The SA Medical Research Council contracted Jembi as a technical partner to assist in the development of a management solution which provides schoolgirls with an integrated approach to health management, with a focus on their well-being. The solution had to address high priority outcomes such as the reduction of pregnancies, the reduction of HIV infections, viral suppression, and maternal and child health for pregnant adolescent girls and young women (AGYW).

Jembi assisted in:

- gathering of requirements over a series of interviews;
- documenting business processes;
- delivering a conceptual architecture recommendation for an implementer to adopt; and
- recommending different options for technologies to use in order to implement the solution.



29. Road to Health Booklet

The Digital Road to Health Booklet (RTHB) is still available on the Google App Store. Because the content is still relevant to new caregivers, no additional content or media has been added to the user experience so far. Where possible, Jembi has actively been promoting the RTHB as a vehicle for additional content and media to partners seeking funding for mHealth applications.

The concept of using the RTHB as a vehicle for additional content was presented in a number of project applications in an attempt to increase usage through additional channels. Examples include a project to provide pregnancy information and HIV services to AGYW groups in schools through the WITS HIV Research Institute and the University of Pretoria, and a separate grant through the Fogarty foundation in implementing a similar programme. Unfortunately these proposals were not accepted for funding. Although this has not impacted the original application, it is believed that adding fresh content would increase uptake. A RTHB companion app was developed to assist health workers in understanding the value of the digital form of the RTHB and its features. The companion app also provided the health workers with instructions on how to assist a caregiver in downloading and installing the app onto their phones, registering their infants and tracking their infants' immunisations and weights. The companion app, however, is linked to the NDOH App Store being adopted by the department of health, which is still pending.

Through Professor Janan Dietrich (SAMRC and IAS CIPHER Fellow; Director: Bio-Behavioural Research at the Perinatal HIV Research Unit; and Associate Professor within the School of Clinical Medicine at Wits), a survey was conducted with a group of RTHB end-users to evaluate their experiences in mobile health applications. The result of this work is still to be published, and Jembi will use these results to inform future versions of the RTHB. The proposal received the required ethics approval and Jembi provided a list of users and their contact details so that the researchers could call the end-users.

Mozambique Programme

Overview

The 2020-2021 financial year registered significant growth and continuation for Jembi Mozambique, with the award of another 5-year Cooperative Agreement with CDC for the 2020-2025 period following a successful proposal, put together by the Jembi Mozambique team of proposal writing experts. In addition, Jembi was awarded the Data For Implementation project (Data. FI) in Mozambique in collaboration with Palladium, with the aim to develop a dashboard for the Ministry of Health's HIV programme (funded by PEPFAR and USAID) and to conduct a feasibility study (funded by UNICEF) for the computerisation of child protection systems in Mozambique.

All work plans were successfully completed for the year. This achievement has contributed to the continuation of these projects and the allocation of additional funding, whilst also solidifying Jembi's partnerships and collaborations with local, regional and international partners.

The Jembi Mozambique portfolio consists of these 15 projects:

- 1. Electronic Patient Tracking System (EPTS)
- 2. Help Desk
- 3. PEPFAR Systems Documentation
- 4. PEPFAR Infrastructure
- 5. IT Technicians in the Provinces (ITP)
- 6. HIS Support to MOH central level
- 7. Civil Registration and Vital Statistics (CRVS)

- 2. USAID

- 8. Gender-Based Violence (GBV) eIMD system
- 9. Capacity Building
- 10. Monitoring and Evaluation (M&E)
- 11. Programme Monitoring and Knowledge Management
- 12. EducaMoz
- 13. UNICEF Child Protection System
- 14. Data.FI (Data for Implementation)
- 15. CARDNO Master Trainer

The projects are funded by these 6 donors:

Cooperation

- 1. CDC
- 3. CARDNO
- 4. The Italian Agency 5. UNICEF for Development

 - 6. Terre Des Hommes

Jembi Mozambique currently has:









warehouses with high quantities of HIS equipment and hardware



4x4 vehicles



camping trailers



Mozambique Programme



Dr. Alessandro Campione, the Jembi Programmes Director and Jembi Representative in Mozambique.

This year was evidently

challenging due to the COVID-19 pandemic, which presented some risks to the day-to-day operations of our Mozambique offices. In this regard, Jembi established a COVID-19 Crisis Management Unit (CCMU) in the first two weeks of March 2020, which was before the first COVID-19 case was detected in Mozambique.

The CCMU defined, implemented and enforced all COVID-19 preventive measures and created all biosafety conditions for Jembi Mozambique staff, considering Mozambique government, CDC and WHO regulations and protocols.

The CCMU coordinated the acquisition and maintenance of all personal protective equipment (PPE) for the office and managed Jembi's COVID-19 relief support to the Ministry of Health during the State of Emergency. As an NGO operating in the health sector in a low resource country such as Mozambigue, Jembi did not close its Mozambique offices during the State of Emergency. This was crucial considering our mandate to serve the Ministry of Health and to comply with our work plan targets, and this helped ensure the continuity of our activities with cooperation partners at all levels.



Jembi team supporting COVID-19 efforts of the MOH and INS through the provision of vehicles with drivers.

COVID-19

In light of the COVID-19 emergency, Jembi provided practical support to the Ministry of Health (MoH) and the National Institute of Health in efforts aimed at combating the adverse effects of COVID-19 across the country.

Jembi's support in this regard included the following actions:

- Conducted Rapid Assessment of COVID-19 initiatives in the region and beyond.
- Provided five cars and drivers to Maputo Provincial Health Directorate and National Health Institute for COVID-19 health workers, test samples and surveys.
- Donated 4,000 informative pamphlets to the Ministry of Health to raise awareness in rural communities.
- Developed the COVID-19 mobile app for the Ministry of Health.

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As an NGO operating in the health sector in a low resource country such as Mozambique, Jembi did not close its Mozambique offices during the State of Emergency.

- Installed Wi-Fi network at reference hospital for COVID-19 in Maputo, Polana Caniço Health Facility.
- Made Jembi staff available to support MOH activities during the state of emergency.
- Supported COVID-19 meetings at provincial level.
- Provided IT equipment for MOH staff to work remotely.
- Supported gathering of statistical data on vaccinations during the national COVID-19 vaccination programme.
- 31 Jembi Mozambique staff benefitted from phase one of the National COVID-19 Vaccination Programme.

Mozambique Programme

1. Electronic Patient Tracking System (EPTS)

The Electronic Patient Tracking System (EPTS) is the main PEPFAR system used to collect data on HIV patients and manage medical records in health facilities, producing quality data for PEPFAR reporting and for MoH Health Management Information systems (HMIS). Jembi has been in the process of updating, harmonising and centralising the OpenMRS EPTS platform in collaboration with Friends in Global Health (FGH), the Ministry of Health (MoH) and other PEPFAR clinical partners under CDC coordination and funding.

Jembi and FGH have been working collaboratively to ensure that the data collection and reporting of all PEPFAR clinical partners are harmonised and updated, and that data are produced through a certified practice to guarantee quality data for quarterly, semi-annual and annual PEPFAR and MOH reports.

Key results:

- All indicators matching 100% in all seven databases from the PEPFAR clinical partners.
- Elaboration and revision of all requirement documents for MER quarterly reports.
- Elaboration of requirements for MOH monthly reports.
- Validation and certification of the MOH monthly reports in all seven databases.
- Validation and certification of the MER quarterly indicators in all seven databases.
- All EPTS quarterly releases done.
- Support for EPTS quarterly releases and updates at the MOH.
- Oevelopment of the harmonisation tool according to CDC recommendations.



The Help Desk and Support Service led by Jembi in Mozambique since October 2018 is a central platform and service centre for reporting technical issues related to health information systems and infrastructure supported by PEPFAR. It is a communication service between the different departments of Jembi (BA, developers, implementers, infrastructure and logistics), users, and all clinical partners of PEPFAR. It solves a wide range of problems through a complex, standardised, and organised workflow, with strict roles of confidentiality and security and regular M&E and statistics production for reporting.

The Help Desk has 137 users and 37 agents (Support Agents, Lights and System Administrator) from 20 organisations and institutions. They are CDC, Jembi, Nweti, EGPAF, JhPiego, FGH, NIH, ICAP, Ariel, CCS, USAID-ECHO, ECHO Moz, M2M, Ministry of Justice, DIMAGI, World Education, DoD, APHL, Vukoxa and FHI-360.



The Jembi Mozambique Help Desk team, composed of Marcelino Mugai, Banucho Cassamo, Vânia Afonso and Elisio Macia.

Key results:

- Help Desk SOPs and terms of reference developed and updated as required.
- 2 100+ technicians from partner organisations and national institutions trained in Help Desk by the Jembi team.
- Over 400 tickets have been addressed through the Help Desk channel since October 2018.
- 100% satisfaction rate for problem-solving via the Help Desk service, according to PEPFAR partners and other institutions that use the help desk channel managed by Jembi.

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PEPFAR Systems Documentation 3.

Since October 2020, Jembi has been given the task of supporting the development, update and revision of technical documentation and manuals related to the HIS systems supported by PEPFAR, which include EPTS, iDART for desktop and mobile, DREAMS, GBV (e-IMD), VMMC, and others as requested.

Key results:

- EPTS user manual and training manuals updated based on all the latest releases.
- iDART desktop user manual updated based on the latest releases.
- DREAMS user manual updated.
- In the final stages of developing a standard set of training materials for the EPTS system.

Jembi technician Nataniel Cumbe is accompanied by driver Diodino Ting at Inharrime health facility in Inhambane province CENTRO DE SAUDE DE INHARRIME for electrical infrastructure installation.



PEPFAR Infrastructure 4

Jembi is responsible for supporting the standardisation, procurement, installation, implementation, maintenance and storage of PEPFAR infrastructure and equipment used for health information systems across Mozambique. The Jembi team defines equipment specifications, carries out all procurement and acquisition processes, readiness assessments in the field, delivers and installs the equipment along with clinical partners in several provinces of the country. The equipment and materials include servers, desktops, SIS-Compact stations, UPS, scanners, barcode scanners, printers, routers, cables, solar panels and any other equipment that may be required for the sustainable and uninterrupted use of health information systems supported by PEPFAR.

Jembi manages over 1,000 pieces of equipment in its Maputo warehouse, using asset management software. Jembi staff that worked in the field during the COVID-19 pandemic were given all required PPE and first-aid kits in order to prevent any form of infection on-site.

Key results:

- Electrical and IT installations in 8 health centres of the province of Gaza, under the IDART project in coordination with EGPAF.
- Readiness Assessment and installation of IDART in 4 health facilities in Inhambane province.
- Delivery of IT equipment to clinical partners CCS, EGPAF, ICAP and ECHO.
- Solved Wi-Fi issues in 3 health facilities of Maputo Province, namely: Ndlavela, Boane and Habel Jafar health facilities.
- Procurement, acquisition and storage of equipment in the Maputo warehouse.

Mozambique Programme

5. IT Technicians in the Provinces (ITP)



Elton Savela, a Jembi IT technician in Inhambane, supports the maintenance of DPS hardware.

Through its IT technicians seconded to the Provincial Health Directorates (DPS) of six provinces of Mozambique, Jembi has supported the MOH in the maintenance and use of HIS hardware and software as well as health statistics reporting in the provinces and districts. The ITPs rendered routine support in the six provinces for the entire year with 710 hardware and software maintenance interventions. They resolved 97% of the requested technical interventions at the DPS level.

Key results:

- New IT technician allocated to Maputo Cidade DPS.
- Total of 710 hardware and software maintenance interventions in key provinces.
- 97% of all requests for technical assistance resolved at DPS level.

6. HIS Support to the MoH



Jembi has been providing direct technical assistance to the Ministry of Health through its two senior technicians seconded to the Department of Health information (DIS), supporting all national HIS development needs and monitoring and evaluating the health statistics efforts. Jembi technicians also provide on-the-job training where required to ensure sustainability of HIS developed for the country.

Key results:

Health data analysis for the elaboration of 12 monthly health statistics bulletins published on the MoH website.

- 100% of technical intervention requests were solved at DIS level.
- COVID-19 support provided to the MoH through the Directorate of Planning and Cooperation and the National Institute of Health.

Jembi technicians provide on-the-job training where required to ensure the sustainability of HIS developed for the country.

- Support for organising the national HIS meeting, which occurred in Macaneta, Maputo Province.
- Provision of training in the expansion of the Hospital Data management module.
- Support in the revision of national HIS policies and standards.

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7. Civil Registration and Vital Statistics (CRVS)

Jembi supports national CRVS initiatives through the Interinstitutional Vital Statistics Working Group (GITEV) and the Ministry of Justice, Constitutional and Religious Affairs (MJCR). Jembi also provides technical support in the interoperability between eCRVS (SiRCEV) and the Hospital Data Management Module (MGDH) of the MoH. In collaboration with the University Eduardo Mondlane, Jembi attended several high-level meetings of GITEV as members to ensure proper coordination and planning of national CRVS strategies in Mozambique.

Jembi has been supporting improvements to SiRCEV functionalities and providing assistance on the overall maintenance of the system. For the first time in Mozambique, mortality data from the hospital data management is available in the national eCRVS system - this is after Jembi helped develop and successfully pilot the interoperability solution in the Mavalane Hospital of Maputo City. Following the pilot's visits, there was a request for Jembi to continue supporting the expansion of the interoperability solution to seven other provinces of Mozambigue.



SiRCEV is used at the Civil Registry Office with data from MGDH.

Key results:

- Interoperability plan elaborated, monitored and achieved with MJCR and the MOH.
- Harmonisation of variables between SiRCEV and MGDH.
- User guide developed on the use of the interoperability solution and delivered to MJCR to incorporate in SiRCEV manual.
- Output for SiRCEV system updates, functionalities and improvements.
- Bugs and errors resolved on SiRCEV system.
- Development of the interoperability solution.
- Our Successful test and acceptance of the interoperability solution.
- Successful Pilot of the interoperability solution at Mavalane Hospital in Mozambique.

Gender-based Violence (GBV) eIMD System

The gender-based post-violence care assessment and monitoring system (GBV) seeks to generate indicators that ensure that the care offered to victims of violence is accessible, of high quality and that the infrastructure, equipment and services are available. This project has been recently added to the Jembi portfolio by PEPFAR and is currently in a transitional phase. Jembi is in the process of acquiring all the existing documentation and information from the system to continue its development and maintenance in the coming year.

Key results:

Participation in all transition and knowledge transfer meetings.

Jembi developer Itélio Lucas with Head of Civil Regis-

try Office during SiRCEV interoperability expansion.

- Collection and study of all system documentation.
- Presentation of plan for the development and maintenance of the GBV eIMD system.

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Jembi participation at the 2020 OpenMRS Virtual Conference. This past year, 12 Jembi staff members attended.

9. Capacity Building

The training and recruitment of local stal have been at the centre of Jembi's support to national institutions in Mozambique in partnership with UEM, CRDS (Regional Centre of Training in Health), and the Ministry of Labour. This is to ensure local ownership and project sustainability. Since 2011, Jembi has trained, and supported the training of, professionals of the National Health System and several other sectors. A total of 2,903 professionals were trained in various courses such as SISMA, SISH, SIS-ROH, ICD-10, Project Management, DHIS2 Academy, OpenMRS Academy, Health Statistics, Basic and Advanced Excel, Basic Computer Literacy, English, Solar Panel systems, Help Desk, EPTS / SESP and the GBV eIMD system.

As a partner of the Ministry of Labour and through the National Institute of Employment and several local universities, Jembi's internship programme hosted nine interns this year. Two of the nine interns were hired as full time staff, including one Junior Developer and one Project Assistant. Jembi will continue investing in building local capacity to ensure project sustainability and ownership by the Mozambican people.

95% of the 57 Jembi Mozambique staff members are Mozambican and have been trained in several technical, management and administrative areas to keep improving their performance. Jembi's capacity building activities include attending conferences and events for information sharing, and expanding the network of partners and collaborators. This past year, 12 Jembi staff members participated at the Virtual OpenMRS Conference, which was hosted by Nepal and included virtual health facility visits. At the conference, Jembi presented the results of the inaugural OpenMRS Academy, which was launched in Mozambique in September 2020.

Key results:

- 70 PEPFAR implementing partners trained in Help Desk.
- 10 staff from health facilities trained in the installation and use of solar panel systems.
- 15 MOH staff trained in English Language for the Professional Environment.
- 15 MOH staff of DTIC and the HIV Programme trained in EPTS.
- 13 Implementing partners, MOH central level staff and UEM students trained in OpenMRS Academy Level 1 Fundamentals Course.
- 6 UEM Veterinary Laboratory technicians trained in Microsoft Excel.
- 5 Jembi M&E staff trained in advanced Microsoft Excel.
- 2 Jembi staff trained in the Help Desk.

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Anti-clockwise, starting top right:

Dr. Andy Kanter co-facilitating a remote session on the OpenMRS concept dictionary with Jembi developer, Clério Faife, during the first course of the OpenMRS Academy.

Trainees receiving certificates by UEM and Jembi representatives.

Entrance to the inaugural OpenMRS Academy level 1 course at the UEM Medical School.

Trainees at the OpenMRS Academy.

10. OpenMRS Academy

Mozambique was the stage of the first edition of the OpenMRS Academy, which started with the Level 1 course called "OpenMRS Fundamentals." This was after the proposal presented by Jembi during the 2019 International OpenMRS Implementers Conference in Mozambique, and the subsequent expression of interest by the Rector of the Eduardo Mondlane University on the creation and establishment of OpenMRS Academies at national, regional and international levels.

Jembi/UEM-Moasis, with funding from the US President's Emergency Plan for AIDS Relief (PEPFAR) and through The Centers for Disease Control and Prevention (CDC), together with the OpenMRS Community, created a working group dedicated to the creation of the curriculum, training materials and all other didactic, pedagogical and logistical elements of the first course of the OpenMRS Academy.

Jembi/UEM-Moasis was responsible for coordinating this OpenMRS training held in Maputo between 29 September and 1 October of the current year at the Faculty of Medicine of the Eduardo Mondlane University, respecting the established standards for COVID-19 prevention in Mozambique. The training, which was divided into four modules, was given both in-person and online. It was convened by specialists in OpenMRS from the community based in the cities of Chicago, Boston and Seattle (United States of America), Nairobi (Kenya), Kampala (Uganda) and Maputo (Mozambique). 13 trainees participated, including university students (in the fields of medicine and computer science), officials and technicians of the National Health System, and clinical partners of PEPFAR, who are part of the OpenMRS community.

The four modules of Level 1 consisted of theoretical presentations and practical exercises, that addressed the following themes:

- Introduction to Information Technologies for Health and Electronic Medical Record (EMR) Systems.
- Best Practices for the Development of EMR Systems in collaboration with Ministries of Health in developing countries.
- 3. OpenMRS Overview. and
- 4. OpenMRS Technical Overview.

The goal of OpenMRS Academies is to support the long-term sustainability of OpenMRS-based systems in low-resource environments (Africa, Asia and South America), thereby expanding the knowledge and skills

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in the use of OpenMRS by different information systems professionals in health. In Mozambique, the OpenMRS Academy aims to provide current and future technicians from the National Health System and PEPFAR implementing partners with the necessary skills to develop, implement and manage health information systems based on OpenMRS.

As the coordinating organisation of this initiative, Jembi is currently working together with OpenMRS and community members to expand the offer of courses and guarantee the certification and sustainability of the OpenMRS Academy in Mozambique, at the regional and international levels.

Key results:

- Joint OpenMRS Academy work plan with Jembi, University Eduardo Mondlane and OpenMRS community.
- Concept Note for the OpenMRS Academy completed and approved by the OpenMRS Community.
- Fundamentals Level 1 course curriculum developed and approved by the OpenMRS Community.
- Fundamentals course training materials developed, including PowerPoint presentations, practical exercises, tutorials, and instructional videos.
- 3-Day course successfully carried out with the participation of 13 learners at the UEM Medical School, following all COVID-19 protocols and guidelines set forth by the Government of Mozambique.
- Elaboration and presentation of the inaugural academy course report at the 2020 Virtual OpenMRS Conference.



SI-M&A Training for trainers and refresher training on paper-based instruments and the electronic system.

11. EducaMoz

The EducaMoz project, led by Terre Des Hommes (TDH) with technical assistance from Jembi, aims at raising the guality of inclusive preschool education services by improving the professional training of child operators in Mozambique and strengthening the innovative monitoring and evaluation information system of the Ministry of Gender, Children and Social Affairs (MGCAS). Jembi supported MGCAS in the development of its Monitoring and Evaluation Information System (SI-M&A), and supported the expansion of SI-M&A in the Sofala province for the EducaMoz project.

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Jembi supported MGCAS in the development of its Monitoring and Evaluation Information System (SI-M&A).

Key results:

- Jembi worked along with TDH and the MGCAS at the central level to establish a list of new indicators to be entered into the system.
- Jembi elaborated and submitted the SI-M&A Sofala Data Report.
- Routine technical support provided to the provincial office by the Jembi IT technician allocated to the Sofala province.
- 11 Maputo province staff received TOT and refresher training on SI-M&A (for paper-based and electronic systems). The staff of all 8 districts in the province will be trained by them.

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12. UNICEF Child Protection System Computerisation

Following a successful bid, Jembi was awarded the project by UNICEF to support the government of Mozambique across sectors in the feasibility study for the establishment of an integrated computerised system for the management of the National Registry for Child Protection and support the development of terms of reference for the development of the best technological solution. Jembi carried out the feasibility study in three provinces, namely Maputo Province, Tete and Nampula.

For the assessment, the Jembi team interviewed key staff from several institutions, including: the Ministry of Gender, Children and Social Affairs; the eGovernment National Institute; the National ICT Institute; the National Institute of Communications at the central level; the Supreme Court; and the Juvenile Court, Provincial courts, District and Provincial level directorates of the Ministry of Gender, Children and Social Affairs as well as pre-schools at the provincial level.

Key results from the Feasibility Study:

- Assessment protocol developed.
- Legislative landscape assessment done.
- Stakeholders mapping done.
- Software Mapping report done.
- Analysis of requirements for child protection computerised systems done.

13. Cardno Master Trainer



Dr. Moisés Mazivila (representing Jembi) and Dr. Armindo Tiago, Minister of Health



The Minister of Health, First Lady and US Representative at the front, staff from the First Lady's Office and Jembi Representative at the back.

Jembi partnered with Cardno in Mozambique to support a gynaecologist Master Trainer for Cervical Cancer capacity building in Mozambique. Jembi rendered administrative, contract management, logistics and monitoring and evaluation services to the project for 15 months as the Master Trainer led regional training for cervical cancer prevention and treatment. As part of the support provided to the Ministry of Health and to respond to the adverse effects of COVID-19, Jembi in partnership with PEPFAR, Cardno and MD Anderson supported the procurement and acquisition of hospital supplies and health equipment for the clinical diagnosis of cervical diseases delivered to the National Cervical Cancer Programme through the First Lady of Mozambique, Her Excellency Isaura Ferrão Nyusi, at the Presidency of the Republic. In addition to the First Lady, the Minister of Health (Dr. Armindo Tiago), Jembi Mozambique Programme Coordinator (Dr. Mazivila) and United States Embassy representatives attended the ceremony.

The equipment and materials included 10 mobile ODT colposcopes, 11 desktop computers (Dual-Core), 11 projectors/data show, 3000 FFP2 masks, 1000 visors, 1000 goggles, 60 glove boxes, 30 logbooks, 11 hotspot/ Wi-Fi connectors (4G LTE preferred), 33 data/internet packages (three months per province), and one Zoom licence. With this gesture, the MD Anderson-PEPFAR-CARDNO and Jembi UEM-mOASIS partnership hope to have contributed to increasing the prevention, improving the diagnosis and treatment of precancerous lesions, and decreasing the number of cases that progress to cervical cancer in Mozambique.

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14. Data.Fl

Jembi is collaborating with Palladium in Mozambique under the Data.FI (Data for Implementation) project to develop and implement a dynamic dashboard for the MOH HIV Programme. The Data.FI aims to improve global, regional and national in-depth analyses of HIV epidemiology and programme data that can be directly applied to expedite the achievement of PEPFAR targets to attain and sustain control of the HIV epidemic. The focus also includes directly supporting host country governments to further enhance existing health information system platforms to inform management responses to well-defined gaps in HIV/AIDS programming.

Key results:

- Desk review for national HIS standards, protocols, indicators and systems.
- Elaboration of the interview guide.
- Requirements gathering with the MOH for the dashboard.
- Zechnical Working Group Terms of Reference established.
- Memorandum of understanding produced for the project.
- Requirement documents in final stages of elaboration to proceed to development.

15. One Health and Veterinary Sciences

Jembi is collaborating with the Istituto Zooprofilattico Sperimentale dell'abruzzo e del Molise (IZSAM) to strengthen research capacity for veterinary sciences and address human health issues linked to animal health. With its experience in capacity building, Jembi is supporting the implementation of a project in Mozambique that is training veterinary staff in informatics and veterinary health courses.

Social Events and Institutional Development



Some of the Jembi Mozambique ladies during the Mozambican Women's Day Celebration, from left to right: Albertina Luís, Vânia Afonso, Avelina Zavale, Katia Paulino, Anatércia Chichango and Sheila Mussane.

Mozambican Women's Day

Jembi Mozambique women were celebrated on Mozambican Women's Day. As is traditionally the custom in Mozambique, every woman in the office was offered a colourful sarong (locally known as *capulana*) and all Jembi women were celebrated and thanked by the Director, Dr. Alessandro Campione and the management team for their effort, dedication and hard work to accomplish Jembi's goals.

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Social Events and Institutional Development





Jembi Mozambique team institutional development workshop participants.



Jembi Mozambique implementer Banucho Cassamo intervenes during a discussion on increasing productivity at the institutional development workshop.

Jembi Mozambique driver Diodina Tinga presents results from the group sessions in plenary.

"

Jembi Mozambique Institutional Development Workshop

The Jembi Mozambique team convened at the Regional Center for Health Development (CRDS – Maputo) with the aim of analysing current projects, plans, resources and validating the organisational structure in order to establish how to better adapt to the challenges posed by new projects and the global pandemic.

The workshop was attended by 23 employees, including the programme director in Mozambique (Alessandro Campione) and the CEO of Jembi Health Systems (Chris Seebregts), who checked in remotely. The participants consisted of staff from Jembi's various departments, including Coordination, Implementation, Human Resources, Administration and Finance, and Infrastructure.

Participants discussed topics in groups and in plenary on various subjects, including local organic structure, resource mobilisation and sustainability, cross-cutting and interaction between sectors and employees, as well as redundancy and contingency among employees. Having discussed lessons learned, it was clear that after a challenging albeit successful year, the Jembi team was ready to embrace future endeavours. The participants consisted of staff from Jembi's various departments, including Coordination, Implementation, Human Resources, Administration and Finance, and Infrastructure.



Corporate Services

Presentations

Publications



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Presentations

December 2020

VIRTUAL Global Digital Health Forum

Simplifying data adaptation between systems with the OpenHIM and the OpenHIM Mapping Mediator // By Matthew Dickie

Q VIRTUAL **Global Digital Health Forum**

Simplifying deployment of Health Information Exchanges with Instant OpenHIE // By Daniel Futerman

Q VIRTUAL **Digital Square Global Good Innovator Meeting**

Simplifying deployment of Health Information Exchanges with Instant OpenHIE // By Daniel Futerman

Q VIRTUAL **2020 OpenMRS Virtual Conference**

Conceptualising, Designing and Implementing the First OpenMRS Academy // By António Macheve Jr.



Corporate Services



General review of operations

The directors have pleasure in presenting their report for the year ended 28 February 2021.

Jembi Health Systems NPC ("Jembi") had a planned reduction in both income and expenditure during the financial year running March 2020 to February 2021 which is explained in further detail in the Operations and CEO reports. Jembi's planning works around a five-year cycle that also links into the period of our funding awards. September 2020 was the ending of our latest five-year cycle and a new five-year cycle started in October 2020. Jembi feels very fortunate in today's trying times to have been able to enter into three new five-year cycle awards in addition to many shorter projects starting within this new cycle. This cements Jembi's ongoing situation as a going concern as we enter FY22 with a forecast of growth in both of our two Programme divisions in South Africa and Mozambique.

Income Growth

Jembi's overall income was reduced by 50% to ZAR 86.6 million at the end of financial year FY21. This figure is not including interest earned. Expenditure figures were closely aligned to income over the same period, decreasing by 49% to ZAR 87 million. The company reserves saw an increase of ZAR 168,000 due to interest earned over the FY21 year.



Programmes



Jonnea Smith. Director of Corporate Services.

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Jembi feels very fortunate in today's trying times to have been able to enter into three new five-year cycle awards in addition to many shorter projects starting within this new cycle.

Donor Landscape

Income in this financial year was mainly derived from United States Government Federal Grants, which represented 58% of the total income and was split between the CDC (50%) and USAID (8%), both through Prime awards and Sub-agreements. The remaining 42% of annual income was derived from other donors. This is a result of many years of trying to diversify Jembi's funding pool in order to reduce Jembi's reliance on any one single donor source and ensure the sustainability of its operations. Our non-USG funders are a combination of local and international organisations, with funding coming through philanthropy and foundations as well as partner organisations.

Expenditure Breakdown

Jembi's executive team was strengthened this year with the addition of a new Programmes Director. This has resulted in Jembi's programmes being grouped into two programme areas for the year ending FY2021: the Mozambique Programme and the HQ Programmes Division. The expenditure across the two programme areas was broken down as follows: 35% for the Mozambique Programme and 65% for the HQ Programmes Division.

Due to the COVID-19 pandemic and the conclusion of various five-year agreements, Jembi had a reduction in expenditure during the 2021 financial year. As could be expected, the most significant difference in expenditure seen from FY20 to FY21 was a reduction in travel, procurement and contractual expenditure.



MOZAMBIQUE PROGRAMME



Decrease of Staff in 2021

At the end of February 2021, Jembi's staff numbers had decreased to 108. The Mozambique office experienced a decrease of 18%, thereby ending the year with 58 staff members, and the South Africa base dropped to 50 staff members following a reduction of 11%. Thus, the wrap up of the two large projects at the end of their five-year project cycles both in Mozambique and South Africa at the end of September resulted in an overall decrease of staff numbers of 15% from FY20.



Impact

Our year by the numbers



Jembi's Collaborators

Jembi thanks all our collaborators for a successful year.



Jembi Health Systems

Annual Report

2020/21

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