



## **GENERAL: UDSM DHIS2 LAB-TANZANIA CAPABILITY STATEMENT**

**The University of Dar es Salaam (UDSM)** established in 1962, is Tanzania's oldest and largest public University. The University's vision is to become a leading Centre of Intellectual Wealth, spearheading the Quest for Sustainable and Inclusive Development. The College of Information and Communication Technologies (CoICT) under UDSM, was established to develop capacity and advance research, innovation, and application of ICT across all sectors. The Department of Computer Science and Engineering (CSE), the full-fledged department under the CoICT, has over 50 highly skilled and experienced academic and technical staff members with PhD, Master, and Bachelor's degree levels qualifications in Computer Science, Computer Engineering, Data Science, Health Informatics, Software Development, and Information Systems, and a broad range of high technical qualifications, experience, and competencies of more than 30 years in the ICT industry.

**UDSM-DHIS2 Lab** is located at the College of Information and Communication Technologies (CoICT) Kijitonyama Campus under the Department of Computer Science and Engineering (DoCSE). The UDSM-DHIS2 Lab is also a member of the Health Information Systems Program (HISP) and DHIS2 open Source Platform Network, an international network of research institutions and development institutions coordinated by the University of Oslo (UiO) and present in more than 70 countries. The lab hub was established to support the Government ministries and departments, implementing partners, and other key stakeholders in strengthening and implementing sustainable digital information systems using open-source software platforms in Tanzania. For the past 20 years, the UDSM-DHIS2 Lab has been serving as the technical arm for ministries and implementing partners in designing, developing, customizing, and implementing the DHIS2 / OpenMRS platforms and other open source digital solutions to meet the demands of the ministries of Health (Mainland and Zanzibar), Agriculture, Water, Social Welfare and Education including multi-sectoral initiatives.

## **WHAT WE DO AT UDSM DHIS2 LAB**

UDSM DHIS2 Lab adopts a four-legged approach where participatory software development, innovation, capacity building, and action research are carried out in an integrated fashion and collaboration with various partners while ministries play a central role. This model has been the successful formula for the lab's scaling, DHIS2 sustainability, and continuous innovation of other related systems.



We provide support in the customization and development of digital solutions and innovations using DHIS2 & OpenMRS platforms and other web & mobile technologies within and beyond the health context. Our main expertise lies in advanced software development, data analytics and visualization, integration and interoperability, Project Management, capacity building & training, action research, digital innovation, and Decentralized user support & system maintenance (as summarized in the figure below)



## OUR VISION AND MISSION

Our Vision and Mission are linked to the Mission and Vision of the UDSM CoICT & CSE Department to which it belongs as defined in the CoICT Strategic Action Plan. The CoICT vision is to "become a leading center of excellence in training, research, innovation, and consultancy in computer science and engineering, electronics and communication technologies, and e-learning

The Vision and Mission of the UDSM DHIS2 lab are therefore defined as follows:

### **Vision:**

To become the leading digital research and innovation laboratory on open-source software development and design for data use based on a multidisciplinary,



collaborative, and participatory approach to addressing complex challenges and emerging data, human, and societal needs in Africa and globally.

**Mission:**

To promote integrated research, education, and innovation in open-source digital technologies and data to creatively develop innovative digital and data solutions that sustainably support developing nations in achieving local, national, and sustainable development goals.

**CORE COMPETENCIES**

**Extensive Experience:** The lab's human resource capacity has grown substantially in quality and quantity over the past 20 years. Currently, the lab comprises a large team of over thirty (30) academic (~50%) and full-time technical staff (~50%) who have accumulated extensive local and international experience and broad knowledge of software development, Data Analytics, and information systems design & implementation in Africa and beyond using DHIS2/OpenMRS platforms and other related digital technologies.

**Mixed Skill Sets:** Our dynamic academic & technical team includes skilled and experienced staff of different levels of expertise and education with Ph.D., master's, and bachelor's degrees. We have twelve (12) full-time tech developers, five (5) full-time analysts, and 13 academics with specialties in requirement gathering and analysis, software development and testing, quality assurance, Data analytics and visualization, training and capacity building, project management, and evaluation.

**Cost-Effective, Quality Products and Sustainable Service:** we are firmly committed to delivering exceptional super-value client-centric digital services to ensure long-term client satisfaction. Our cost-effective, innovative products and timely services make us unique in the ICT industry market, enabling us to build long-term client relationships and create a positive reputation that attracts new clients while retaining existing ones through long-term support arrangements.

**Creativity and innovation:** we constantly work to create and deliver quality standard outputs to our clients. We follow the innovation process, from ideation to value creation to ensure we



come up with impactful solutions that are sustainable and meet our clients' needs over time.

**Dynamic and flexibility:** Our lab is built on a combination of dynamic cultural, strategic, and operational elements of the university institution that collectively enable us to navigate change, seize opportunities, address complex challenges, and stay ahead in a rapidly evolving business and digital technology landscape in the ICT industry.

### **Research and Education:**

Our approach integrates MSc and PhD research and learning into our Project implementations to investigate various aspects of the project areas and test different approaches and techniques whose findings are used to inform our development and innovation process.

## **TECHNICAL IMPLEMENTATION COLLABORATIONS AND ACHIEVEMENTS**

### **A: National Projects**

In collaboration with the Ministry and various partners, we have facilitated the implementation of different digital solutions and integration using the DHIS2 platform.

- I. Developed and implemented Tanzania's national DHIS2 data warehouse for all HMIS data & vertical programs and its integration with other various health data systems
- II. Tanzania Health Management Information System (HMIS) - we played a crucial role in developing the Tanzania National Health portal for the Ministry of Health Tanzania (available at: <https://hmisportal.moh.go.tz/hmisportal/>) to provide free access to aggregate statistical data to the general public. We continue to provide technical support to MOH and other implementing partners to ensure the improvement and sustainability of the Tanzania National Health Portal
- III. Electronic Integrated Disease Surveillance Routine System (eIDSR) - strengthening the surveillance systems in Tanzania Mainland and Zanzibar. We developed and implemented the Electronic Integrated Disease Surveillance and Response System (e-IDSR) with an outbreak management module in Tanzania. The system leverages the DHIS2 software technology capabilities and is integrated with the national DHIS2 systems. The system is currently implemented in more than 200 health facilities in the Mainland and Zanzibar
- IV. National Laboratory Information System - we developed and implemented the National Public Health Laboratory information system. This system was intended



to manage the electronic management of laboratory samples from sample reception and registration to the process of sample testing, results entry, and releasing of laboratory testing results.

- V. iCareConnec+ EMR system - the Integrated Hospital Management Information System (iCareConnec+) is an electronic information system that facilitates collecting, analyzing, and reporting various information at a health facility as a patient interacts with different points of care. Patient care management clinic, laboratory, billing, pharmacy and inventory, emergency, referrals, reporting, and financial administration are among the health facility functional areas addressed by iCareConnec+.

Most of the projects on which we collaborate with the ministry, partners, and stakeholders are based on health vertical programs for sustainable health systems that are integrated into the National HMIS which include:

1. Applications for Malaria Control Programmes

We work collaboratively with NMCP, the MoH-ICT team, and other malaria key stakeholders in the development and maintenance of the following system components

- Malaria Dashboard within DHIS2
- Malaria Case Based Surveillance (CBS)
- Malaria Service Data Quality Improvement Electronic Database System, (MSDQI EDS) mobile application
- Malaria Composite Management Information System
- Larva Management System

2. Applications for Tuberculosis (TB) & Leprosy Control Programmes

We have worked with NTLP and TB stakeholders in the development and maintenance of the following system components

- DHIS2 ETL - Case-based system for tracking treatment progress for TB and Leprosy clients.
- Community TB mobile application - for enabling community health workers to screen TB suspects in the community.
- Electronic Data Quality Assessment
- Integration of DHIS2 ETL and 10 color module Gxpert machine
- TB Mobile clinic - for efficient data capture during field operations and incorporates real-time data transmission between mobile vans and central databases



- Tuberculosis Preventive Therapy (TPT) Application - a monitoring and evaluation framework for TPT adherence among healthcare providers and patients
3. Applications for COVID-19 control programs
- We have been collaborating with the Tanzania Ministry of Health to implement a mechanism to manage travelers' diagnosis & certifications and COVID-19 vaccination management which resulted in the implementation of:
- PimaCovid-19 App- an application that allows travelers from Tanzania to book sample collection appointments from the specified health facilities and receive their test certificates.
  - Afya Msafiri App - an application that will allow travelers coming to and departing from Tanzania to screen and book for COVID-19 diagnosis at the point of entry.
  - The Chanjo Covid App - an application to manage booking for COVID-19 vaccination, vaccination process, and stock management.
4. Applications for HIV control programs
- We have worked with the National Aids Control Program (NACP) and stakeholders in the implementation of the following activities
- PEPFAR/MOH Data Alignment Activity: which is carried out every year aiming to align MoH and PEPFAR data systems, data collection is centered around the national platform and focuses on HIV data dissemination and use.
  - NACP Dashboard and Scorecards in HMIS - which provide quick access to the monitoring and evaluation tools and provide an overview of the performance HIV program respectively (HTS, CTC, KVP, 95-95-95 Cascade, CBHS, PMTCT)
5. Applications for Reproductive and Child Health (RCH) programs
- MPDSR within DHIS2 - for collecting maternal and perinatal death information.
  - Family planning dashboard

## **B: Beyond Health projects**

- I. Human Resource for Health Information System (HRHIS) - a system used for capturing, reporting, and analyzing all human resource-related data from all health facilities (Private, Public, and FBOs) to higher levels in the country.



- II. District Cases Monitoring System (DCMS)- we collaborated with the Ministry of Community Development Gender Women and Special Groups (MCDGWSG) together with the President's Office Regional Administration and Local Government (PORALG) to implement the integration of the Social Welfare's DCMS in the Government DHIS2
- III. Agricultural Routine Data System (ARDS) - in collaboration with the Ministry of Agriculture, Livestock and Fisheries (MALF), we developed the ARDS Web Portal and upgraded the ARDS-LGMD2 to a web-based application and integrated it into the Web Portal.

### **C: International Projects**

- I. SADC TB Dashboard - In collaboration with the SADC secretariat and ECSA, we established a regional data repository and dashboard for TB, TB/HIV, and other occupational lung diseases, where Member States can readily upload their data and allow SADC access for compilation and analysis of data
- II. WISN POA for Guinea Bissau - in collaboration with Touch Foundation, we have developed the Workload Indicators of Staffing Need (WISN) and Prioritization and Optimization Analysis (POA) as HR management and planning tools for measuring the service delivery workload of Health workers in hospitals.
- III. Cross-Border Referral System (CBRS) - in collaboration with ECSA, we are developing the CBRS system to manage and track TB patients across SADC member countries.

### **LIVING LAB INITIATIVE**

We develop innovative products through the digital health living lab offered by the Government of Tanzania at the University of Dar es Salaam Hospital. The integrated DHIS2 lab and the Digital Health Living Lab based at UDSM Hospital's working environment offer a sustainable and real-life environment to ideate, develop, use, and evaluate digital health solutions addressing the health system's existing standards, emerging needs, and multiple stakeholders. This ecosystem has enabled the development of Laboratory information systems used at the National Public Health Laboratory and the interoperability Adapter, a breakthrough solution for vendor-based EMRs, and the DHIS2 integration.



## **TRAINING AND CAPACITY BUILDING**

We implement comprehensive training and capacity-building programs to empower users to harness the full potential of the digital systems we develop for improved efficiency, productivity, and user satisfaction. We involve various processes aimed at equipping users with the knowledge, skills, and resources needed to effectively utilize the software to its fullest potential.

- **Conduct Needs Assessment:** we conduct a thorough assessment to understand the specific needs, skill levels, and existing knowledge of the user to help in tailoring the training program to address the specific requirements of the users.
- **Customized Training Plan:** Based on the needs assessment, we prepare a customized training plan to address the identified gaps and requirements.
- **Training Material Development:** we develop comprehensive training materials such as user manuals, tutorials, videos, and interactive guides.
- **Training Delivery:** Conduct training sessions using various delivery methods such as instructor-led training, online webinars and video tutorials
- **Hands-On Practice:** Provide opportunities for hands-on practice with the software in a simulated or real environment. Encourage users to explore different features, functionalities, and workflows to gain practical experience and confidence.
- **Feedback and Support:** Solicit feedback from participants during and after the training sessions to continuously improve the training program and the systems as well. We offer ongoing support channels such as online support systems and dedicated support teams to address any questions, issues, or challenges users may encounter





## **RESEARCH SUPPORT AND COLLABORATION**

Over the past 20 years, the lab hub's research ecosystem has produced several MSc & PhD graduates and scientific publications in HIS and health informatics. Besides, the Lab experts have collaborated with faculty in other universities in carrying out joint research activities and co-supervision of the PG students. Some ongoing projects are:

The research project "The Developing Education with Input from CoordinATED Research Students" (DEDICATED) Programme (NORPART-2021/2015) is a joint collaborative 5 years project that started in 2021 between the University of Dar es Salaam DHIS2 Lab (UDSM) - Tanzania, University of Oslo (UiO) - Norway, University of Malawi (UNIMA) - Malawi, and University of Eduardo Mondlane (UEM) – Mozambique funded by Norwegian Partnership Programme for Global Academic Cooperation (NORPART). This project focuses on building advanced Health Information Systems and Health Informatics capacity in partner countries. The fellowships offered through the DEDICATED provide an



opportunity for four academic staff registered at their home institutions to travel to the University of Oslo (UiO) or other partner institutions involved for a maximum of three months per year to take any courses related to their research, work on proposal/thesis/paper writing, and meet their supervisors for Ph.D. supervision. The student research areas focus on improving usability, interoperability, and data visualization of digital data systems for strengthened impact and sustainability

### COLLABORATING PARTNERS

The lab works closely with the Government ministries and departments, vertical programmes implementing partners, and other key stakeholders in strengthening and implementing sustainable information systems using open-source software platforms in Tanzania. The lab hub has collaboration with more than 30+ partners locally and globally.

