Data Economy

DIPC

Digital Innovation in Pandemic Control

Summary Report

german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by
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PAHO Pan American Health Organization / World Health Organization Americas Region

PATH digital square

unicef

Regenstrief Institute

ROBERT KOCH INSTITUT

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Summary

Digital technologies could save African health systems up to $11 billion by 2030, supporting vaccine distribution, increasing use of health data or better understand disease incidence in the population. **Digital Innovation in Pandemic Control (DIPC)** funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), **strengthens digital health systems in partner countries and at global level.** DIPC (EUR 14 million, duration until 11/2025) supports the introduction of digital information systems as a central component of a health system at national, regional and global level. The aim is to reduce the mortality rate from infectious diseases in the partner countries of German development cooperation (DC) through improved vaccine distribution, with women, children and the rural population benefiting in particular. Towards this aim, DIPC drives the introduction of digital solutions for vaccine distribution as an integral part of resilient health systems on a national, regional, and global scale. DIPC is a **global pioneer of the World Health Organisation's (WHO) approach to digital health.**

Implementing global strategies:
DIPC implements the Global Health Strategy of Germany and contributes to the digital and health visions of the BMZ by strengthening resilient, inclusive and sustainable digital health systems and supporting the global introduction of the digital vaccine certificate in line with the International Health Regulations (IHR).

Partners:
The global project is being implemented through GIZ in collaboration with international partners Digital Square at PATH, UNICEF, Pan American Health Organisation (PAHO), Robert Koch Institute and the Regenstrief Institute as well as the **governments (Ministry of Health) of our implementing countries (Ghana, Sierra Leone, Malawi, Tanzania and Peru).** Global goods developers as much as local software providers are trusted technical partners who bring our vision to life.

Our Approach

DIPC is implemented in 4 Work Packages:

WP1

Country Implementation:
Driving Digital Transformation in Health

PAHO
PATH digital square
unicef

DIPC implements the WHO digital approach in five countries (Tanzania, Malawi, Ghana, Sierra Leone and Peru), envisioning a unified digital health system that improves patient care across different health care levels and disease programmes. Clear technical standards modeled after the GovStack principles and aligned with the WHO approach facilitate cooperation and enable the gradual expansion of the system. The DIPC approach ensures alignment with the national guidelines roadmaps and priorities, leverages previous investments and simplifies future further development of the national health system.

WP2

Global Product Suite:
Strengthening standards based open-source software

PATH digital square

DIPC directly invests in new functionalities of mature software used in many partner countries, closing gaps that bilateral or regional projects do not cover. In particular, this component strengthened development and documentation of the reference software for the WHO approach.

WP3

Capacity Building:
Experts for the digitalisation of the health sector

Regenstrief Institute

In partner countries, DIPC strengthens the development and implementation of national digital literacy programmes for healthcare workers and develops ICT talent. The global training course on atingi is the only course worldwide that specifically empowers IT professionals in the health sector. The Strategic Alliance for ICT Literacy in Health (STICH) will further develop the course, update it regularly and coordinate collaboration to implement the WHO Digital Health Framework.

WP4

Research and Evidence Generation:
Project planning based on facts

ROBERT KOCH INSTITUT

Through its collaboration with the Robert Koch Institute (RKI), DIPC uses scientific findings to improve the planning and monitoring of projects. The RKI further provides an independent evaluation of the DIPC programme to identify best practices and challenges, strengthening evidence-based programme planning in digital health.

Success of DIPC:

Implementation period:
2022 - 2025

Countries:
- Ghana
- Sierra Leone
- Tanzania
- Malawi
- Peru

WP1: COUNTRY IMPLEMENTATION

09 **Ecosystem mappings**

05 **Digital Adaptation Kits (DAKs)** supporting the vaccination management systems

05 **Solutions developed**

110,400
Digitally Registered Vaccinated Beneficiaries across the 5 countries

904 **Health facilities** across the 5 countries

2nd LACPASS Connectathon (Nov 2023)

73 Successful tests under Track 2 (DDCC/DDVC)

16 Countries advanced global vaccine certification using the WHO-DDCC FHIR standard and trust framework.

WP2: GLOBAL PRODUCT SUITE

01
Geo-widget

WP3: CAPACITY BUILDING

+3k
People trained across the 5 countries

1,151
People trained online
48% women

WP4: RESEARCH AND EVIDENCE GENERATION

02 **Publications in scientific journals**

01 **Textbook**

06 **Approvals of ethical review boards**

07 **Project components evaluated**

+30 **Presentation on conferences**

21 **Evidence factsheets**

How does DIPC implement the WHO approach?

DIPC aims to achieve full digital support for vaccine logistics processes in existing national immunisation and pandemic prevention programmes following the WHO SMART Guidelines. In each country we work with the representative political counterpart and one of the implementing institutions per country to achieve this goal.

With these co-operations DIPC realizes the following activities:

- Map the national digital health ecosystems.
- Scale and integrate software.
- Decide on priority gaps in software landscape.
- Develop costed plans and engage governments.
- Localise WHO SMART Guidelines.
- Support cross-country data-sharing through the introduction of the Global Digital Health Cerfication Network (GDHCN).

What are the WHO SMART Guidelines?

WHO SMART Guidelines offer a five-step approach to promote the adoption of superior clinical and data practices, even in cases where a country hasn't fully embraced digital technology. The five levels of the approach stand for "standards-based, machine-readable, adaptive, requirements-based and testable". The guidelines as such form a comprehensive collection of reusable digital solutions for healthcare systems that are intended to facilitate and transform the adaptation and implementation of overarching standards.

WHO SMART Guidelines

- Softwares standard based on treatment guidelines.
- Supports task-shifting and point of careservice quality.
- Country level adaptation.

Watch DIPC VIDEO about Smart Guidelines

WHO Reference Software

OpenSRP 2

EM care FRONTLINE EMERGENCY CARE

OpenWallet FOUNDATION

Clearing house & Sandboxing

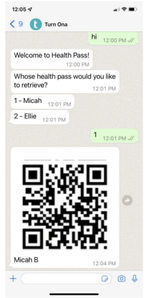
- Testing of Software against the WHO standards.
- Quality Assurance.

Global Digital Health Certification Network (GDHCN)

- Digital Vaccine Certificate.
- International patient summary.
- The GDHCN can be used to certify any other documents such as training certificates.

Health Wallet App

Sticker



WhatsApp

Country Implementation

Sierra Leone

Tanzania

Ghana

Malawi

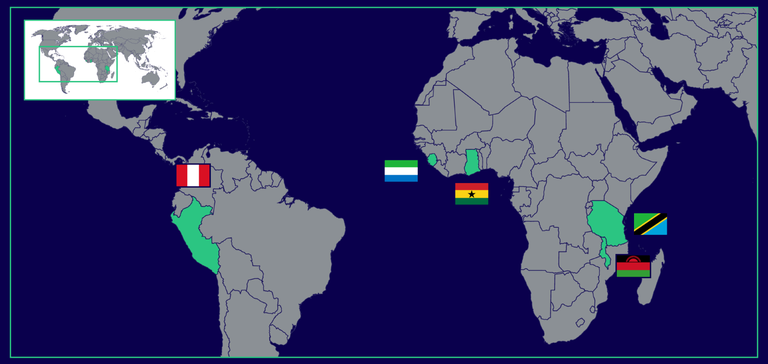
Peru

Implementing Partners

unicef

PATH digital square

PAHO



The implementation of digital health solutions in partner countries has played a significant role in strengthening immunisation programmes and health information systems. DIPC has supported **country-specific solutions** that align with WHO SMART Guidelines and ensure seamless vaccine registration, stock management, and reporting.

DIPC Approach

Map the national digital health ecosystems.

Work with governments to develop national strategies, costed roadmaps and decide on priority gaps in software landscape.

Localise WHO SMART Guidelines and develop a Digital Adaptation Kit (DAK).

Work with country government, global good creators and local developers to implement the WHO standards into the national health systems.

Scale the developed solution.

DIPC Project in Ghana

Advancing Child Health through Integrated Digital Immunisation

DIPC Ghana Factsheet

Implementing Partner PATH digital square

Building on the insights gained from Ghana's ecosystem mapping, the Ministry of Health, in collaboration with Digital Square at PATH and GIZ, initiated a national effort to strengthen digital immunisation and child health services. Guided by the Policy, Planning, Monitoring and Evaluation Directorate (PPME), a consultative process led to the enhancement of the Child Health Module (CHM) a tool integrating immunisation, cold chain, and growth monitoring features.

The design phase was anchored in Ghana's National Digital Health Strategy (2023–2027) and informed by a System and User Requirements Document (SURD) based on the WHO Digital Adaptation Kit (DAK). The project launched officially in early 2023, gaining strong momentum through high-level government support.

In February 2024 the DIPC project partnered with the **Ghana Health Service (GHS)** to enhance and nationally scale the **Child Health Module (CHM)** within the **District Health Information System 2** (**DHIS2) E-Tracker.** This system now tracks essential vaccines, supports vaccination planning, and records adverse events following immunisation.

Ghana Milestones

February 2023 — Kicked off DIPC project by executing a **Memorandum of Collaboration** with the Ghana Health Service to recognise the partnership.

June 2023 — Facilitated **software requirements gathering workshop** for digital systems supporting immunisation using a human-centered design approach to meet user needs.

Published **landscaping report** highlighting current state of digital systems supporting immunisation in Ghana.

December 2023 — Completed **localised immunisation digital adaptation kit** in line with WHO'S SMART Guidelines Approach to designing software.

February 2024 — Managed EIR **software enhancement** work with local partner HISP-Ghana.

May - November 2024 — Led CHM **software deployment** to the Volta and Ahafo regions, providing training and post-deployment support to health workers.

July 2025 — Provided government with **robust sustainability package,** including training materials, technical documentation, sustainability planning, and mentorship to ensure effective CHM knowledge transfer.

"Through DIPC, we could digitalise our vaccination system from the point of care to central level planning. We are now all set to introduce the digital vaccine certificate and deliver on Ghana's commitment to the international health regulations".

Dr. Alberta Biritwum Nyarko, Director Policy, Planning, Monitoring and Evaluation (Ghana Health Service)

Ghana: Outcomes & Achievements

01 **Enhance DHIS2 E-Tracker so it can serve as Ghana's nationally scaled immunisation information system.**

→ Improve access to data for decision making. Increase health worker efficiency and effectiveness.

02 **Strengthen health worker capacity to effectively use digital immunisation systems.**

→ Promote the continued use and adoption of digital solutions.

03 **Support interoperability of current digital immunisation tools by providing detailed requirements for an interoperability layer (IOL) to evaluate potential candidate software tools that best meet GHS needs.**

→ Ensure selection of solutions align with GHS needs and priorities.

Ghana Software Features Overview

Feature	Description
Name of the solution	E-Tracker: Enhanced Child Health Module (CHM)
Main functions	Child immunisation, Growth monitoring, Cold chain management
Frontend technology	Web-based, open-source interface
Database	Relational (details not disclosed)
Offline capability	Yes
Offline sync method	Scheduled to sync with DHIS2
Interoperability	Yes – aligned with DHIS2 and national HIS
Standards supported	Based on WHO DAK for immunisation
Security	Login access, source code stored in public/semi-restricted repositories
Hosting	MoH Ghana – PPME Directorate
Technical challenges	Device availability, internet/data costs
2025 improvements	Hardware procurement and scale-up to 741 facilities

Immunisation Digital Solution Enhanced: E-Tracker Enhanced Child Health Module (CHM)

731 **Health Facilities Implemented**

02 **Regions** (Ahafo and Volta), **24 districts**

+50k **Digitally Registered Vaccinated Beneficiaries**

1,487 **Professionals trained** **69%** women

Strategic Priorities Moving Forward

Following the successful rollout of the enhanced Child Health Module (CHM) in selected regions, **Ghana is now focused on expanding and strengthening its digital immunisation ecosystem.** The next phase includes:

- Nationwide scale-up of the CHM across all remaining regions and districts.
- Infrastructure upgrades, including tablets and reliable internet for health facilities.
- New feature development, such as SMS reminders and biometric identification.
- System integration with other national health platforms like LHIMS.
- Sustained capacity building, with emphasis on inclusive, gender-responsive training models.

GHANA

Ghana Success Story

Empowering the Next Generation:

Persis & Rebecca's Journey into Digital Health

Persis Yonnison

"I no longer saw digital health as abstract, it became a mission."

At the Women in Digital Health event in Accra, Ghana, two emerging talents: **Persis Yonnison** and **Rebecca Yennumi** joined a cohort of young women to explore the expanding field of digital health. What began as a learning opportunity soon became a turning point in their lives.

Persis, a fourth-year medical student, was inspired by a live skit that illustrated the collaboration between project managers, analysts, developers, and QA specialists. "It brought everything to life," she said. "I no longer saw digital health as abstract, it became a mission." Later, at the **Global Digital Health Forum in Nairobi,** she gained deeper insight into how digital innovation is shaping maternal health, mental health, and global health systems. "For me, digital health is now a call to action."

Rebecca initially thought digital health was mostly about coding. But through the event's workshops and startup stories, she discovered a broader field filled with opportunities from health systems and data management to local innovation. "I realised I don't have to wait for change. If I see a problem, I can start solving it."

Both women completed a Health Information Systems Roles Quiz, helping them identify strengths in roles like **Business Analyst** and **Project Manager.** As winners of a prize draw, they were sponsored to attend the Nairobi Forum, where their understanding and passion grew even stronger.

Rebecca Yennumi

"I realized I don't have to wait for change. If I see a problem, I can start solving it."

DIPC Project in Malawi

Scaling Digital Immunisation for Real-Time Decision-Making

DIPC Malawi Factsheet

Implementing Partner PATH digital square

Following an ecosystem mapping in Malawi, key gaps were identified in the visibility of vaccine delivery and client-level immunisation tracking. These findings emerged from a consultative process with stakeholders from the Ministry of Health, Digital Square at PATH and GIZ during a national system and user requirements workshop. The team prioritised developing a solution that could respond to the growing need for integrated, real-time immunisation data—while aligning with both local health strategies and global standards.

To address this, an Electronic Immunisation Registry (EIR) was developed and integrated into the national Malawi Healthcare Information System (MaHIS) platform. To ensure technical and policy alignment, the WHO Digital Adaptation Kit (DAK) for immunisation was localised and used as the foundation for system specifications.

The DIPC project supported the Malawi MOH with the rollout of the MaHIS EIR improving in this way Malawi's existing interoperability layer (IOL) to enable data exchange between different systems. Connecting the EIR with the IOL facilitate data exchange with OpenLMIS, iCHIS, and other relevant systems, improving access to comprehensive records, streamlining workflows, and eliminating duplicate data entry. Malawi Implementation video

Malawi Milestones

February 2023 — Kicked off DIPC project with the Malawi Ministry of Health in **alignment with national digital health strategic priorities.**

July 2023 — Completed a **landscaping report** highlighting the current state of digital systems supporting immunisation in Malawi to ensure the project focused its efforts to addressing priority gaps and mitigated further fragmentation.

Facilitated a **software requirements gathering workshop** for digital systems supporting immunisation using a human-centred design approach so that the software is designed to meet user needs.

August 2023 — Localised **immunisation digital adaptation kit** in line with WHO'S SMART Guidelines

Feb 2024 - Jan. 2025 — Managed **MaHIS EIR software development** work with local partners from Luke International (LIN) and Elizabeth Glaser Pediatrics AIDS Foundation (EGPAF).

Oct. 2024 - On going — Led **MaHIS EIR software deployment** to the Mchinji, Ntcheu, and Salima districts, providing training and post-deployment support to health workers.

Nov. 2024 - Apr. 2025 — Provided government with **robust sustainability package,** including training materials, technical documentation, sustainability planning, and mentorship to ensure effective EIR knowledge transfer.

"Through DIPC, we could digitalise our vaccination system from the point of care to central level planning. We are now all set to introduce the digital vaccine certificate and deliver on Malawi's commitment to the international health regulations".

GIZ office

Malawi: Outcomes & Achievements

01 **Build and deploy a national Electronic Immunisation Registry (EIR)** to operate within the Malawi Healthcare Immunisation Registry (MaHIS).

→ Improve access to data for decision-making. Increase health worker efficiency and effectiveness.

02 **Strengthen health worker capacity** to effectively use and sustain the EIR.

→ Promote the continued use and adoption of digital solutions.

Malawi Software Features Overview

Feature	Description
Name of the solution	Electronic Immunisation Registry (EIR)
Main functions	Immunisation tracking, Stock management, Follow-up reminders
Frontend technology	Web-based (unspecified)
Database	Relational database (exact type not specified)
Offline capability	Yes
Offline sync method	Scheduled sync to MaHIS
Interoperability	Yes – DHIS2, OpenHIM, OpenLMIS, iCHIS
Standards supported	FHIR-aligned through MaHIS integration
Security	User authentication, secure access (unspecified mechanisms)
Hosting	MaHIS national system
Technical challenges	Support responsiveness, hardware limitations in facilities
2025 improvements	Scale-up readiness, training, infrastructure investments

Immunisation Digital Solution Enhanced: MaHIS Electronic Immunisation Registry (EIR)

48 **Health Facilities Implemented**

03 **Regions** (Mchinji, Ntcheu, and Salima)

+32k **Digitally Registered Vaccinated Beneficiaries, +11K dosages documented**

+1,200 **Professionals trained** **41%** women

Strategic Priorities Moving Forward

After the successful rollout of the Electronic Immunisation Registry (EIR) in three districts, **Malawi is preparing for a national scale-up to ensure wider access and continuity of care.** The next steps include:

Nationwide expansion of the MaHIS EIR to 26 additional districts.

Training of over 8,000 health workers and 500+ local trainers to support rollout and system sustainability.

Enhancement of the interoperability layer (IOL) to enable data exchange with systems like OpenLMIS and iCHIS.

Integration of the EIR with national digital health platforms for real-time data and streamlined workflows.

Infrastructure and support systems to reduce manual processes and ensure consistent use across all districts.

Malawi Success Story

Malawi's Electronic Immunisation Registry:

A Model for Strengthening Vaccine Delivery Systems

The Honourable Minister of Health, Khumbize Kandodo Chiponda, MP joins health workers and partners at Kawale Community Hospital for a live demonstration of Malawi's Electronic Immunisation Registry (EIR)

In Malawi, a digital shift is helping health workers deliver vaccines more effectively. Through the DIPC project implemented by Digital Square at PATH in partnership with the Expanded Programme on Immunisation (EPI) and the Digital Health Division (DHD), both housed within the Ministry of Health (MOH), an Electronic Immunisation Registry (EIR) was introduced within the Malawi Health Information System (MaHIS). This new tool is strengthening data quality, reducing reporting burdens, and helping frontline health workers make faster, better-informed decisions about vaccine delivery.

The EIR was rolled out in 48 facilities across Mchinji, Ntcheu, and Salima districts. Health workers received hands-on training in vaccine tracking, inventory management, and real-time data dashboards. By March 2025, the system had registered over 32,000 clients and tracked more than 166,000 vaccine doses. It didn't take long for health workers to experience how the system made their work easier.

"*Previously, we would spend hours compiling reports at the end of each month. Now it's all there automatically. We can spend that time with patients instead*" one health worker shared during a supportive supervision visit. Another added, "*The EIR helps us catch up with missed vaccines faster. We know who is overdue and where to follow up*" highlighting how the system strengthened follow-up and improved vaccination coverage.

The MaHIS EIR was built using the World Health Organisation's SMART Guidelines and a localised Digital Adaptation Kit for Immunisation, developed through collaborative sessions with health workers, programme managers, and the DHD. Key features include real-time access to immunisation data, automated reports, reminder functions to reduce dropouts, and offline functionality for facilities with poor internet connectivity.

To support end users, a WhatsApp support group and direct phone outreach helped resolve issues quickly many within 48 hours. Still, challenges remain: limited reverse billing on Airtel, syncing issues, and app update delays due to the lack of Google Play Store access. As the DIPC project concludes, the MOH is preparing to transition these support functions internally.

With the EIR and capacity now in place, Malawi is poised to scale the EIR nationwide. "*Now that the basics are in place, we're ready to scale this to every district*" one district health officer noted. The MOH is calling on partners to help expand this progress and ensure every child regardless of where they live has timely access to vaccines supported by strong digital systems.

Participants gather for a workshop to validate EIR user requirements in July 2023

DIPC Project in Tanzania

DIPC Tanzania Factsheet

Tanzania's Digital Leap in Immunisation: Strengthening Health Systems through Localised Innovation

Following a comprehensive ecosystem mapping in Tanzania, a critical gap was identified in real-time vaccine tracking and immunisation data visibility at the facility level. In response, a consultative process involving stakeholders from the President's Office, Regional Administration and Local Government (PORALG), Digital Square at PATH and GIZ and the national immunisation Technical Working Group was initiated. This process, conducted across several collaborative meetings, confirmed that strengthening the digital architecture for immunisation would significantly improve service delivery, planning, and logistics.

To address this, the development of an enhanced immunisation solution was prioritised. Ensuring alignment with both national strategy and international best practices, the WHO Immunisation Digital Adaptation Kit (SURD DAK) was localised and used as the foundational framework for the software specifications. This ensured that the solution would be interoperable, standards-based, and responsive to the needs of frontline health workers. The existing solution Government of Tanzania Health Operation Management Information System (GoTHoMIS) was enhanced by PATH in collaboration with local digital partners between mid-2023 and early 2024. DIPC also integrated with the bilateral health project of GIZ which supports paperless hospitals in Tanzania.

Tanzania Milestones

March 2023
Kicked off DIPC project with the Ministry of Health in **alignment with national digital health strategic priorities.**

June 2023
Completed the ecosystem mapping highlighting the current state of digital systems supporting immunisation in Tanzania.

Facilitated a software **requirement validation workshop** for digital systems supporting immunisation.

May 2024
Conducted user acceptance testing for GOTHOMIS based on the localised immunisation Digital Adaptation Kit.

June 2024
Strengthened local expertise through Faster Healthcare Interoperability Resources (FHIR) training to software developers.

July - Sept. 2024
Deployed GOTHOMIS immunisation module at Korogwe, Lushoto, and Tukuyu District Hospitals.

Nov. 2024 - Jan. 2025
Deployed GOTHOMIS immunisation module at Kyela District Hospital and Ipinda Health Center.

Implementing Partner PATH digital square


©GIZ / Dirk Ostermeier

"We have successfully strengthened the Immunisation Module within GOTHOMIS, aligning it with WHO's SMART Guideline, including the Digital Adaptation Kit (DAK), and integrating clinical decision support to enhance immunisation services. This has significantly improved vaccination coverage, increasing the number of vaccinated children across Tanzania".

Dr. Erikc Kitali Director of ICT, President's Office - Regional Administration and Local Government, Tanzania.

Tanzania: Outcomes & Achievements

01 **Localise the immunisation Digital Adaptation Kit (DAK)** so health care is administered according to national clinical guidelines to increase quality of care.

02 **Support the enhancement of the immunisation module within** the centralised Government of Tanzania Health Operations Management Information System (GOTHOMIS).

03 **Provide capacity strengthening to developers from MOH, local entrepreneurs, and other government agencies** focused on Fast Healthcare Interoperability Resources (FHIR) to support data exchange and interoperability.

Requirements gathering workshop in June 2023.

FHIR training workshop in June 2024.

Tanzania Software Features Overview

Feature	Description
Name of the solution	GOTHOMIS (Gov't of Tanzania Health Operations Management Information System)
Main functions	Immunisation registry, Supply chain management, Patient records
Frontend technology	JavaScript
Database	SQL (MySQL, PostgreSQL)
Offline capability	Not yet available (planned for 2025)
Offline sync method	Not applicable yet
Interoperability	Yes – with DHIS2, OpenHIM, MoH HIS
Standards supported	FHIR, HL7
Security	SSL/TLS, Role-based access control (RBAC)
Hosting	Local server
Technical challenges	Inadequate infrastructure, limited local technical expertise
2025 improvements	Integration with UCS and NHIF; Capacity building for developers and health workers

Immunisation Digital Solution Enhanced: GOTHOMIS

05 **Health Facilities Implemented** (Korogwe, Lushoto, Tukuyu, Kyela, and Ipinda)

02 **Regions** (Tanga and Mbeya)

+6,700 **Digitally Registered Vaccinated Beneficiaries**

93 **Professionals trained** **38%** women

Strategic Priorities Moving Forward

With the enhanced immunisation module successfully deployed in selected facilities, Tanzania is now focused on expanding digital coverage and strengthening system interoperability. The key next steps include:

Scaling the GOTHOMIS immunisation module to all Phase 2 districts and facilities nationwide.

Integrating GOTHOMIS with other digital platforms, such as the Unified Community System, for broader health data connectivity.

Advanced FHIR and SMART Guideline Ongoing training for health workers to ensure consistent and effective system use at all levels of care.

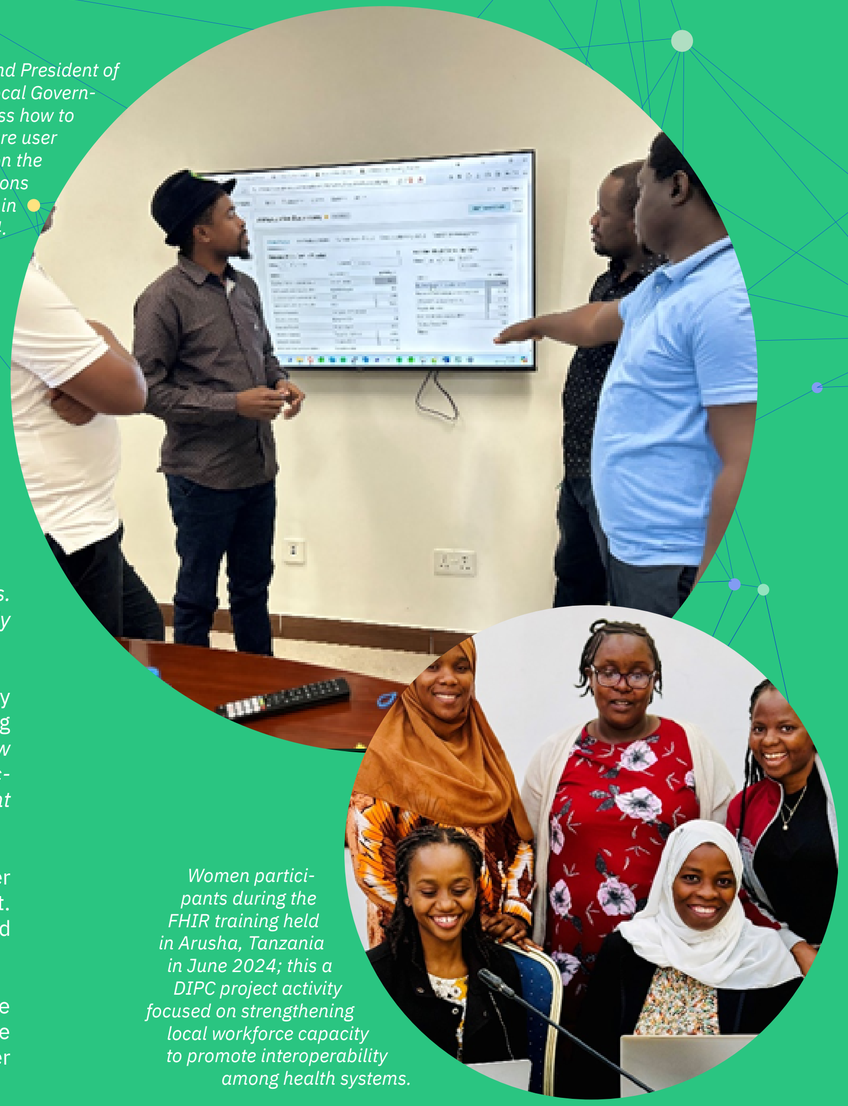
Adopt the digital vaccine certificate and integrate it with the national health wallet.

Deploying the WHO SMART Guideline approach to **improve mother and child service.**

Tanzania Success Story

GOTHOMIS Boosts Immunisation Services in Tanzania:

Health Workers See Real-Time Gains



Isaac Sahera, PATH and President of the Regional Administration and Local Government (PORALG) developers discuss how to make the GOTHOMIS dashboard more user friendly for health workers who rely on the system to make data-informed decisions in Kibaha District, Tanzania in May 2024.

Women participants during the FHIR training held in Arusha, Tanzania in June 2024; this a DIPC project activity focused on strengthening local workforce capacity to promote interoperability among health systems.

©GIZ / PATH / Irene Kemilembe (2)

Across Tanzania, healthcare workers are embracing a digital tool that is supporting how immunisation services are delivered. Through DIPC project, the immunisation module within the Government of Tanzania Health Operations Management Information System (GOTHOMIS) was enhanced to support a wider range of vaccines, introduce tailored dosage schedules, and improve tracking of vaccine stock levels, order requests, and distributions. The updates also streamlined client registration, vaccine administration, and improved overall workflow and user experience for frontline staff.

In partnership with the President's Office Regional Administration and Local Government (PORALG), and with support from Digital Square at PATH, the Ministry of Health (MOH), and GIZ, the enhanced immunisation module was rolled out in select health facilities across Arusha, Mbeya, and Tanga regions.

Health workers participating in training and deployment at facilities such as Kaloleni Health Center, Kyela District Hospital, and Korogwe District Hospital reported significant changes. The burdens of paper-based systems—slow data retrieval, duplication, and incomplete records—were replaced with more efficient workflows and reliable access to timely immunisation data.

"*This immunisation module in GOTHOMIS will be very helpful, as there are often challenges when someone needs immunisation data, especially for the Council Health Management Team,*" said Yasinta Duwe, Matron Nurse at Kaloleni Health Center. "*Previously, it could take a long time to go through paper documents. However, with this system, it will now be much easier because we can quickly search for data based on the requested time frame.*"

In Korogwe, end users noted that the system's design allowed them to easily navigate the immunisation module and capture key data points without needing to rewrite or reprint forms every time a change was introduced. "*Once the new GOTHOMIS EIR system is rolled out to all facilities, the introduction of a new vaccine will have fewer cost implications because we will no longer need to reprint the tools,*" shared a PORALG representative.

To ensure sustainability, Digital Square also created short videos for refresher training and worked with PORALG to strengthen in-country technical support. The government has since formally requested continued collaboration to expand the system nationally.

By digitising core workflows and engaging health workers in every phase, the GOTHOMIS upgrade is not just a technical success—it is a story of how frontline voices, national leadership, and international collaboration are coming together to build stronger, more responsive immunisation systems across Tanzania.

DIPC Project in Sierra Leone

DIPC Sierra Leone Factsheet

Digitizing Last-Mile Vaccine Logistics for National Visibility

Implementing Partner unicef

Guided by the 2023 Effective Vaccine Management Assessment, Sierra Leone identified a strategic opportunity to strengthen last-mile vaccine logistics through digital stock management. The expanded programme on immunisation (EPI), in collaboration with UNICEF and GIZ, identified the need to improve vaccine logistics through real-time stock visibility, particularly in last-mile delivery. A consultative process across 4 priority districts, further supported by the Health Data Ecosystem Mapping for Sierra Leone, led to the strengthening of the country's existing digital stock management tool eSMT (electronic Stock Management Tool).

While the country chose to prioritize the adaptation of the WHO ANC Digital Adaptation Kit (DAK) over the Immunisation DAK, the eSMT was upgraded with new functionalities focused on:

- Stock arrival and issuing
- Cold chain equipment management
- Physical inventory count and adjustment logging
- Temperature monitoring
- Automated reporting features

This effort, led by UNICEF and supported by BMZ through the DIPC initiative, shows how a data-informed, logistics-first digital solution can contribute to building a more transparent and accountable immunisation system even in fragile, resource-limited contexts.

Sierra Leone Milestones

- **Jun. 2023** — Field needs assessment in 4 districts led by UNICEF.
- **Jul. 2023** — Stakeholder workshops to adapt eSMT to local workflows.
- **Sep. – Oct. 2023** — Training materials validated; Train of Trainers sessions delivered.
- **Jan. – Mar. 2024** — First data reports via eSMT on vaccine stocks and wastage; digital tools deployed.
- **Nov. 2024** — Cascade training of 150 health workers (41% women) across 4 districts.
- **Dec. 2024** — eSMT app fully rolled out in 79 health facilities.
- **Jan. 2025** — Initial eSMT data analysis shows improved forecasting and fewer stockouts.

Sierra Leone: Outcomes & Achievements

01 **Deploy the Electronic Stock Management Tool (eSMT)** across four districts (Karene, Koinadugu, Kailahun, Bonthe) to enable real-time vaccine logistics tracking.

→ **Improve visibility and accuracy** of stock data to support timely decision-making and strengthen supply chain efficiency.

02 **Build capacity of national, district, and facility staff** to use the eSMT for daily stock management and reporting.

→ **Promote adoption of digital tools** and foster local ownership to support scale-up and sustainability.

Sierra Leone Software Features Overview

Feature	Description
Name of the solution	eSMT (electronic Stock Management Tool)
Main functions	Stock tracking, Cold chain monitoring, Reporting
Frontend technology	Web-based (unspecified tech)
Database	Unspecified
Offline capability	No
Offline sync method	Not applicable
Interoperability	Planned – DHIS2, national drug logistics system
Standards supported	Not DAK-aligned (used ANC DAK instead)
Security	Login access, internal protocols
Hosting	Local/national servers
Technical challenges	Digital literacy gaps, poor connectivity/power in rural areas
2025 improvements	Digital skilling

Immunisation Digital Solution Enhanced: electronic Stock Management Tool (eSMT)

97 **Health Facilities Implemented**

04 **Districts** (Bonthe, Koinadugu, Karene, and Kailahun)

18,402 **Digitally Registered Vaccinated Beneficiaries, 137,817 dosages documented**

150 **Professionals trained** **41.40%** women

Strategic Priorities Moving Forward

With a strong focus on interoperability, Sierra Leone is optimising the eSMT to connect with DHIS2 and national logistics systems. To strengthen this progress, next steps include:

Expanding digital skills training for frontline health workers with limited digital literacy.

Improving infrastructure, especially internet connectivity and power at health facilities.

Advancing system interoperability between eSMT, DHIS2, and logistics platforms.

Embedding digital tools into routine district and national workflows.

Enhancing real-time stock visibility to improve planning and accountability.

“I used to wait for someone else to enter reports. Now I do it myself and help others too”

Sierra Leone Success Story

From First Click to Confidence

Digital Shift in Sierra Leone’s Health Workforce

In the remote northern districts of **Koinadugu** and **Karene,** many healthcare workers had never touched a laptop, some had never even seen one up close. As part of the **DIPC** project, this reality became the starting point for a bold digital literacy journey. In total, **150 healthcare workers across Koinadugu, Karene, Bonthe, and Kailahun** were trained through a hands-on course designed to build basic computer skills, email use, digital reporting, and data security. Over **65%** of participants in the northern districts confessed to being first-time users of laptops.

The course didn’t rely on heavy theory. Instead, it used a **low-dose, high-frequency** approach, allowing participants to practice repeatedly with guidance. In areas with no stable electricity, solar kits were provided. WhatsApp groups kept the learning alive after training days ended.

“I used to wait for someone else to enter reports. Now I do it myself and help others too” shared by a proud nurse from Karene.

The impact was clear: health workers who once feared technology (computers) were now confidently completing digital health reports, sending emails, and navigating through the windows screen taking screenshot for reporting technical issues to the district M&Es. Many, especially women, became digital champions in their facilities.

The DIPC initiative didn’t just train people. It unlocked potential turning digital fear into digital fluency, and proving that with the right approach, even the most remote corners of Sierra Leone can be part of the country’s digital health future.

DIPC Project in Peru

DIPC Peru Factsheet

Building Interoperable, Context-Driven Digital Health for the Amazon Frontier

In a country marked by deep geographic and institutional diversity, Peru launched a strategic initiative to digitise and strengthen its immunisation services in remote regions. Led by the Ministry of Health (MoH) and PAHO, and supported by BMZ through the DIPC initiative, the project is focused on enhancing data quality, interoperability, and timely decision-making through a localised, standards-based digital tool. The process began with a mapping of national digital tools and a technical validation of Peru's capacity to integrate WHO SMART Guidelines into its existing health infrastructure. The project aligns closely with the country's regional interoperability strategy and aims to improve care in underserved Amazonian territories: Loreto, Amazonas, and Madre de Dios. **At the core of the intervention is a digital tool built to:**

- Use the FHIR standard for real-time, secure data exchange
- Guide vaccinators' decisions with automated logic based on national recommendations
- Synchronise with national health systems (HIS MINSA and, later, SIHCE)

Though still under development, the application has already been adopted by the Ministry of Health as an official national tool. **The implementation strategy includes:**

- Creation of user guides and training materials
- Deployment of training sessions and local capacity-building
- Early implementation of offline functionality to ensure usability in low-connectivity regions

A pilot is planned across selected facilities in Loreto, Amazonas, and Madre de Dios, especially in riverine areas like Río Santiago, Río Yavarí, and Río Madre de Dios. These areas are typically underserved, making this one of the most ambitious digital outreach initiatives for immunisation in the country.

Despite early governance and coordination challenges, Peru has demonstrated high-level ownership, building an inter-institutional committee to accelerate decisions and promote sustainability. PAHO has proposed turning the tool into a regional public good, potentially benefiting other countries in the region. **As of early 2025:**

- The tool is expected to go live in pilot areas
- Interoperability with HIS MINSA is scheduled for April 2025
- Offline capability is already embedded in the core architecture

Implementing Partner PAHO

Peru Milestones

- **12 – 15 Nov. 2023** — Conectathon
- **Mar. 2024** — WHO Smart Guidelines Workshop
- **May 2024** — Memorandum of Understanding (MoU) between PAHO and GIZ at the World Health Assembly
- **Sep. - Oct. 2024** — Capacity building Community health agents (CHA)
- **Oct. 2024** — ONA workshop on FHIR standard in Peru
- **Apr - May 2025** — **Vaccine Campaigns**
  - Training of CHA and Health Workers
  - Pilot launch
  - Vaccination Week of the Americas
- **Apr. - Jul. 2025** — Digital Literacy course
- **Nov. 2025** — Regional Solution Mockup / Dissemination at PAHO Events

"The digital health solution with it's offline technology which Peru has developed will help us to expand services to hard to reach populations all across Latin America, delivering on a just digital transformation the context of the recently approved resolution for Information Systems for Health 2024-30 by PAHOs Directing Council".

Marcelo D'Agostino, Unit Chief, Information Systems and Digital Health at PAHO/WHO

Peru: Outcomes & Achievements

01 **Development of Digital Tool aligned with WHO Smart Guidelines, including app prototype, training, and server infrastructure.**

02 **Capacity Building**
- Capacity building for community health agents in intercultural health, immunisations, and digital health.
- Capacity building for health workers in digital literacy and use of digital solution.

03 **Vaccination brigades in border regions, piloting the digital solution and coordinating with local authorities.**

Peru Software Features Overview

Feature	Description
Name of the solution	Digital immunisation offline app
Main functions	Decision support for vaccinators, Real-time immunisation tracking
Frontend technology	Mobile app (Android-based)
Database	FHIR-based architecture
Offline capability	Yes
Offline sync method	Periodic synchronisation
Interoperability	Planned – HIS MINSA, SIHCE
Standards supported	FHIR, WHO SMART Guidelines
Security	National standards, authentication protocols
Hosting	MoH infrastructure
Technical challenges	Governance delays, infrastructure challenges in the Amazon
2025 improvements	Go-live in 3 regions, national interoperability, regional public good proposal

Immunisation Digital Solution Enhanced: Digital immunisation offline app

21 **Health Facilities Implemented**

03 **Regions** (Amazonas, Loreto and Madre de Dios)

+3,300 **Digitally Registered Vaccinated Beneficiaries**

115 **Professionals trained**

Strategic Priorities Moving Forward

Following the successful rollout of the enhanced Digital immunisation offline app in selected regions, Peru is now focused on expanding and strengthening its digital immunisation ecosystem. The next phase includes:

Pilot launch expected in early 2025.

Interoperability with HIS MINSA in April 2025.

Potential to become a **regional public good** (PAHO proposal).

Peru Success Story

Strengthening vaccination in the heart of the Amazon:

Lesly's Journey

"Now I can record everything instantly and accurately, even in the middle of the jungle"

©GIZ / Flavia Juarez

In the remote community of Candungos, deep in the Amazon rainforest of Peru, providing healthcare is a daily challenge. With limited staff, long distances between communities and no stable internet access, keeping track of patients, especially immunisations, was a constant challenge. But for Lesly, a dedicated nurse who works at the local health centre, digital innovation is changing that story.

To reach Candungos, Lesly must travel eight hours by river from the province of Condorcanqui in Amazonas. At first, she worked with paper records that deteriorated easily and contained errors, delaying the submission of information. *"Sometimes it took months for vaccination data to reach the national system. That affected planning and vaccine supply."*

During Vaccination Week in the Americas, held from 28 April to 2 May, Lesly began using a new offline immunisation application developed under the Digital Innovation in Pandemic Control (DIPC) initiative.

The application allows users to register vaccines, review medical records, record adverse events (ESAVI), and administer regular and special vaccination schedules, even without an internet connection. Once the device regains signal, the information is automatically synchronised with the national HISMINSA system.

"Now I can record everything instantly and accurately, even in the middle of the jungle,'" says Lesly.

The tool not only improved her work, but also strengthened her as a professional. Today, Lesly trains health personnel in her micro-network in Candungos to implement this solution as well. Since its use, vaccination coverage has improved. With the expansion of this tool to more regions, Lesly's story is just the beginning.

Capacity Building

Implementing Partner | Regenstrief Institute

Based on the WHO Digital Health Competency Framework, DIPC focused on Digital Health planners and developers. Through a global survey, we specified learner personas in this group and constructed a modular curriculum based on their training needs.

Four courses from this curriculum were developed in English and Spanish and relevant existing external courses were mapped into a public training resource repository. A community of practice complements formal training through peer-to-peer learning. A learner persona quiz supports learners in identifying their learner persona and suitable training courses. This foundational work now will be transitioned into the **Strategic Alliance for ICT Competency in Health (STICH)** to support global coordination and synergies beyond the project duration of DIPC.

Project implementation and highlights

- **Development of eHPKN:** A knowledge network that facilitates community meetings on global goods, requirements practices, software testing, quality assurance, and more.
- **Digital Health training courses:** Courses developed on end-user support, software development, global goods, and business analysis.
- **Promoting inclusivity:** Special efforts are made to expand participation and support women in health information systems.
- **Challenges:** Ensuring global representation and accessibility of training materials.

Courses and resources

- **Digital Health End-User Support (Course 01):** This course provides training in theoretical concepts and practical applications, to elevate end-user support practices. Participants will receive an introduction to skills and requirements related to end-user support in the Digital Health environment.

  English: Link Spanish: Link

- **Software Development Life Cycle (Course 02):** This course provides an overview of the practices and methodologies involved in systems development. Learners will be introduced to fundamental concepts, models, and techniques used in each phase of the Systems Development Life Cycle (SDLC).

  English: Link Spanish: Link

- **Global Goods and Community Engagement (Course 03):** This course provides an overview of how global goods can contribute to digital health projects and highlights the value proposition for working with applications that are supported by communities of practice. Participants will learn how to evaluate a global good to determine fit for their context and learn how to effectively engage with global health information systems (HIS) communities.

  English: Link Spanish: Link

- **Business Analysis in Digital Health (Course 04):** This course provides learners with an introduction to Business Analysis in the Digital Health sector. The objective is to equip learners with foundational skills to understand the role of a Business Analyst.

  English: Link Spanish: Link

- **Additional capacity strengthening courses and resources:** Other courses.

Video documentation

- **Capacity Building - WP 3 (ENG):** A video presenting the partnership between the DIPC initiative, the Regenstrief Institute, and the Open HIE learning community, showcasing course development methodology.

  English: Link Spanish: Link

The WP3 capacity building component continues to expand its offerings, aiming to improve inclusivity, enhance accessibility, and support global engagement in digital health systems.

Enrolment Data *(up to on May 2025)*

1,151

Total Number of Enrolments

1,043

Enrolments Learners (unique)

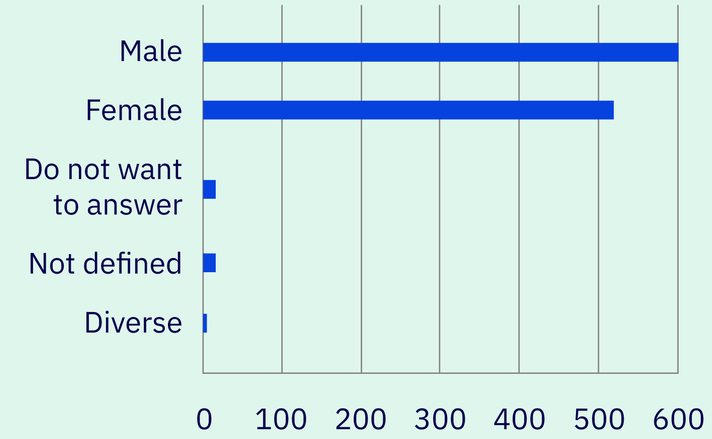
287

Total Number of Course Completions

Enrolments by Course

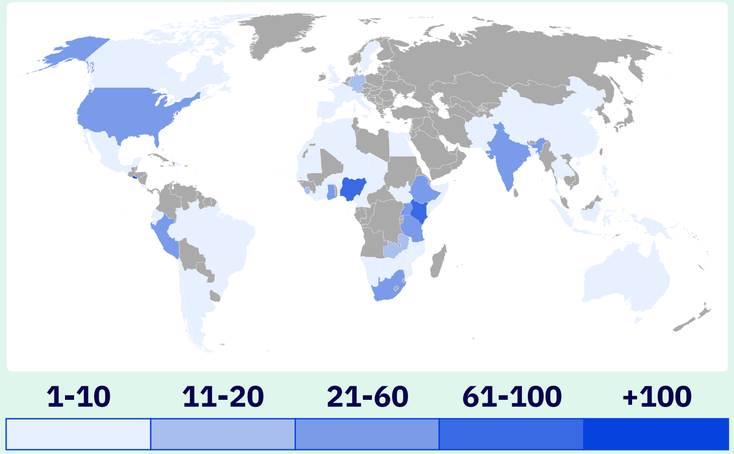
	Course	Number of Enrolments	Number of Course Completions	% Female share
1	**Digital Health: End-User Support** (Aug. 2024)	567	218	51.5%
	Soporte para usuarios finales (Feb. 2025)	26	6	29.2%
2	**Introduction to Systems Development** (Oct. 2024)	208	21	36.8%
	Introducción: Desarrollo de Sistemas (Mar. 2025)	32	5	48.4%
3	**Global Goods and Community Engagement** (Jan. 2025)	63	9	32.8%
	Bienes globales y comunidad (Apr. 2025)	6	2	40%
4	**Business Analysis in Digital Health** (Apr. 2025)	249	26	44.7%

Enrolments by Gender



Enrolments by Country

Nigeria	145
El Salvador	140
India	70
Kenya	66
Peru	59
South Africa	52
Ethiopia	49
Ghana	46
Uganda	44
United States	40
Tanzania	36
Sierra Leone	33
Canada	29



Research & Evidence Generation

Monitoring & Evaluation

Implementing Partner | ROBERT KOCH INSTITUT

Evidence-based programming is key to maximising the impact of health interventions. However, despite rapid digital transformation, there is limited evidence linking digital tools to improved health outcomes especially in low resource settings where funding must be carefully prioritised. This makes digital health research essential. Through the DIPC programme, the **Robert Koch Institute** supports evidence-driven digital health programming to guide effective investment and improve outcomes.

Evidence based –data driven projects

At the beginning of the project, DIPC developed a logic model on how the different workpackages drive digital health impact. At the end of the project, RKI will provide a in-depth project evaluation which will allow to review and revise the theory of change underlying investments in digital health. The impact and relevance of interventions across all partner countries will be assessed and factors identified that drive or hinder digital transformation. In peru, PAHO will be evaluating the deployment of the digital solution in hard to reach populations. Results are expected by September 2025.

Publications

- **Textbook: Navigating the Digital Health Ecosystem.** This textbook reviews key digital health guidelines and tools for developing countries across 12 areas, highlighting challenges like weak impact metrics, lack of gender-sensitive design, and poor system integration, while calling for evidence-based approaches and stronger collaboration.
- **Factsheets:** 21 summary factsheets of the textbook support evidence use in program planning and implementation.
- **Compilation: Indicators for digital health.** Recommendation of software based indicators to measure digital health impact in developing countries.

Peer-reviewed Journals

- **The impact of information and communication technology on immunisation and immunisation programmes in low-income and middle-income countries:** a systematic review and meta-analysis, Zarekar et al. , eBioMedicine, Volume 111. This systematic review and meta-analysis demonstrates that digital solutions significantly improves childhood immunisation coverage in low- and middle-income countries, more than doubling the odds of a child to full immunisation by age one (OR 2.61).
- **Use of Gamified Digital Tools in daily tasks of healthcare workers: A Scoping Review,** Binita Paudel et al. This Analysing 12 studies from over 5,800 sources finds that gamified digital tools can improve healthcare workers' engagement and motivation, but more research is needed to fully understand their benefits and limitations (Submitted for publication).
- **Enablers and Barriers to Implementing Digital Health Wallets in Low- and Middle-Income Countries:** A Scoping Review Synthesis of enablers and barriers to acceptance, adoption and scale of Digital Health Wallets (DHWs) (Results available 8/2025).

Operational and Strategic Research

- **WP4 video (ENG):** This video explores the objectives of WP 4 and highlights the partnership with RKI.
- **DIPC Logic Model**
- **Building Research Capacity:** Researchers from Ghana and Sierra Leone received a stipend that supports joint analysis of evaluation outcomes at the RKI and in order to facilitate international scientific exchange.

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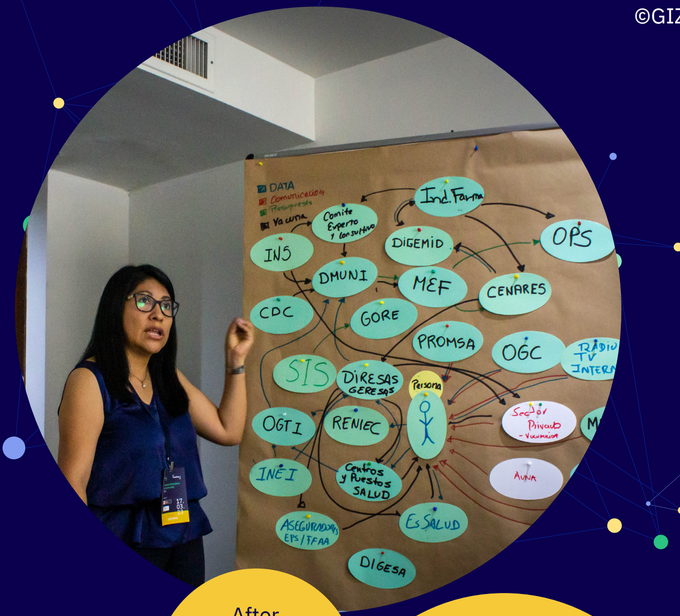

After reading the "Navigating the Digital Health Ecosystem":

"Bravo!"
Dr. Alain Labrique
Director, Digital Health and Innovation (DHI) Science Division (SCI) World Health Organisation Geneva, Switzerland

Conclusion & Next Steps

DIPC will come to an end in November 2025, but it's products will remain available on the DIPC website. We would like to thank all who have been on the DIPC journey for their contribution, commitment, expertise and hard work.

WP1 Country Implementation:

DIPC has developed national digital health systems to improve vaccine delivery and has laid the foundation for countries to adopt digital vaccine certificates in line with International Health Regulations. Building on this progress, bilateral technical collaboration between Germany and partner countries will support the adoption of the WHO approach in some of the countries such as Tanzania where maternal and child healthcare services will be enhanced. GIZ projects working on regional level such as the East African Community or on continental level will take up regional collaboration and cross-country data sharing. Furthermore, Knowledge and products will remain to be used by the DIPC implementing partners and publicly available on their website.

WP2 Global Product Suite:

Investment in cost-effective, re-usable, interoperable and safe digital global goods and digital public infrastructre is crucial to maximise just digital transformation of the health sector. As governments increasingly recognise the importance of national funding for digital health as one of the most important public service, their digital health markets have to be developed to deliver sustainable solutions that are flexible enough to adapt to change. Marketshaping strategies as much as Initiatives like GovStack are needed to make software transparent, high quality and secure, supporting sustainable bussines models for global goods developers.

WP3 Capacity Building:

- On Global level, The Strategic Alliance for ICT Competency in Health (STICH) should build on the products and experiences of DIPC. Together with the WHO, Africa CDC and other Partners, STICH will operationalise the WHO Digital Health Competency Framework within the Global Initiative for Digital Health (GIDH).
- Individuals or organisations interested to participate in STICH can register under STICH@giz.de
- The global Repository for Digital health Training resources will remain open on the OpenHIE website to continue the collection and mapping of courses. Any course provider is welcome to register their course.

WP4 Research and Evidence Generation:

The results of the operational research will be published and shared in dissemination workshops with other GIZ Projects working in digital health. The aim is to jointly move evidence-based programming forward and identify efficient and safe digital tools in the health sector. Results of the scoping review on health wallets will inform the global development of the digital vaccine certificate.

- The global Repository on Frameworks, Strategy and Tools will remain open on the openHIE website, inviting stakeholders to submit and register new and revised documents.


DIPC