Linked Immunisation Action Network

From Guidelines to Action: How Countries Are Using WHO's Digital Adaptation Kit (DAK) to Strengthen Immunisation Systems

Authors: *Kate Wilson, Monica Amponsah, Daniel Adu Asomaning, Tessa Lenneman, Gideon Sarpong Nyamekye, José Enrique Pérez-Lu*

Introduction

As part of the Linked Immunisation Action Network's efforts to support countries advancing their Electronic Immunisation Registries (EIRs), Linked hosted collaborative learning sessions in the Spring 2025 to learn more about the newly released WHO Digital Adaptation Kit (DAK) for immunisation. The series brought together global and national leaders—including WHO, GIZ, PATH, PAHO, and digital health leaders from Peru, Ghana, and Tanzania—to explain why the DAK matters and share practical lessons, emerging best practices, and advice for countries aiming to improve their digital immunisation systems.

What Is the WHO Immunisation DAK and SMART Guidelines?

The first session, held on April 2, 2025, introduced countries to the DAK and Smart Guidelines. The toolkit is a key output of the overarching WHO's SMART Guidelines initiative, which translates the global WHO health guidance into digital workflows and technical standards that countries can adapt. The recording from this webinar can be found on the Linked Network website linked here.

Natschja (Nat) Ratanaprayul, Technical Officer at WHO and coordinator of the SMART Guidelines initiative, introduced the DAK immunisation framework which was officially released in January 2025. The DAK supports the country's progression through a structured process from global immunisation guidance to national level implementation and use. As Nat noted in her opening remarks, the value of these Smart Guidelines lies in the ability for countries to quickly adapt this global content to the local context. The DAK offers a starting point for countries, providing a structured yet flexible way to identify key policies, processes, workflows, standards, and modules that should be implemented nationally, helping countries to build on and better align their existing EIRS with global guidance.
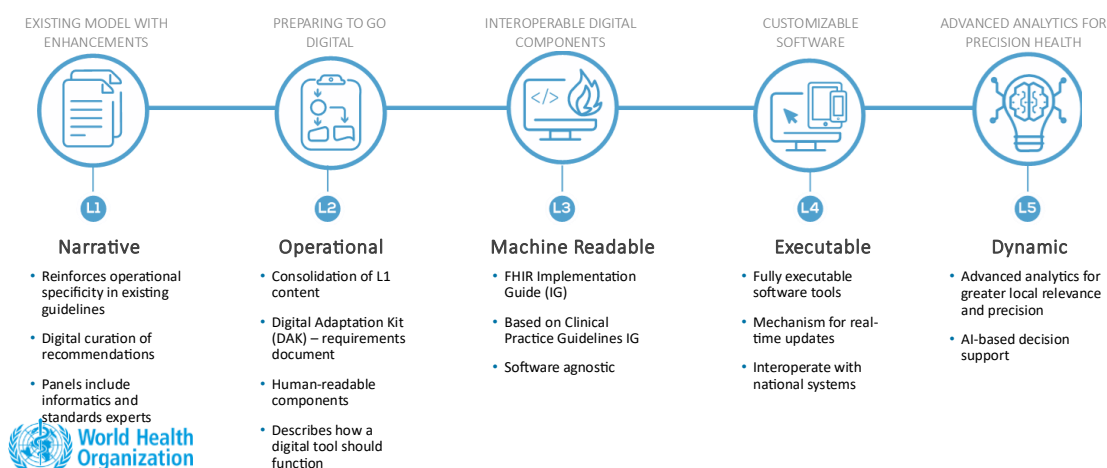
The idea behind developing the WHO Digital Adaptation Kit (DAK) immunisation module was born in part from countries' struggles during COVID-19. Countries needed to incorporate COVID vaccine administration into their existing Electronic Immunisation Registries (EIRs)—but this was often too slow and time consuming – necessitating many to build COVID specific systems. Recognizing that new vaccines regularly need to be added and seeing in real time how outdated infrastructure and inflexible software was preventing countries from being able to quickly adapt their EIRs, the WHO set out to create a dynamic reference that can guide countries that want to re-design their existing systems and take a more integrated, person-centered approach. The DAK was designed to support this paradigm shift, providing clear technical guidance and resources to countries interested in moving toward digital systems that are scalable, interoperable, and centered around individuals rather than diseases or programs.

Central to this approach was the data principle of "collecting once, using many times"—to reduce data duplication and ease the burden on health workers, and improve overall system efficiency. The DAK is also designed to be software-agnostic – recognizing that each country owns their procurement choice. The DAK provides guidance on how countries can align these disparate software solutions, addressing a perennial struggle faced by most digital health leaders globally. In addition to squarely addressing system interoperability, the DAK process addresses other persistent failure points of digital health systems including limited scalability, the use of closed "black box" architectures, and an absence of shared data and digital standards within and across countries. If successfully followed – the DAK should offer a more sustainable and adaptable path forward for countries modernizing their immunisation systems, enabling them to integrate new vaccines as they are introduced.

To achieve this, the WHO Digital Adaptation Kit (DAK) is organized into five interconnected layers that should be followed sequentially as outlined in Figure 1:

SMART Guidelines are a new approach to representing WHO content as digital health components to preserve fidelity and accelerate uptake

Standards-based, **M**achine Readable, **A**daptive, **R**equirements-based, **T**estable

EXISTING MODEL WITH ENHANCEMENTS	PREPARING TO GO DIGITAL	INTEROPERABLE DIGITAL COMPONENTS	CUSTOMIZABLE SOFTWARE	ADVANCED ANALYTICS FOR PRECISION HEALTH
L1	**L2**	**L3**	**L4**	**L5**
Narrative	Operational	Machine Readable	Executable	Dynamic
• Reinforces operational specificity in existing guidelines	• Consolidation of L1 content	• FHIR Implementation Guide (IG)	• Fully executable software tools	• Advanced analytics for greater local relevance and precision
• Digital curation of recommendations	• Digital Adaptation Kit (DAK) – requirements document	• Based on Clinical Practice Guidelines IG	• Mechanism for real-time updates	• AI-based decision support
• Panels include informatics and standards experts	• Human-readable components	• Software agnostic	• Interoperate with national systems	
	• Describes how a digital tool should function			

World Health Organization

Layer 1: Narrative

This layer provides a clear, standardized policy foundation for countries to build on that includes all global guidance. It curates current WHO vaccine recommendations and immunisation content into a digital format and is updated as WHO recommendations change.

Layer 2: Operational

After countries have aligned their policies with WHO recommendations, the next step includes developing their national functional requirements, describing in clear language what are the aims of the EIR and the vaccines to be included based on national policy. The DAK provides a helpful starting point of common workflows, personas, core data elements, and scheduling logic—which makes it easier for policymakers and program managers to envision how systems should work in practice and align it with their actual operations.

Layer 3: Machine Readable

After functional requirements are developed by technical and business teams working together, their operational guidance is transformed into structured, machine-readable code using global standards like HL7/FHIR. This layer was developed to foster standardization and to bridge the gap between business requirements and technical implementation, helping to ensure greater system interoperability and providing a starting point for local EIR developers.

Layer 4: Executable

This layer provides real, country-customizable software components and development guidance that these technical teams can use as they adapt the EIR. WHO's goal in including this depth was to foster faster innovation timelines and Nat noted that in early pilots, some countries had already reported reducing system build time from 9-6 months. As more countries use the tool, we anticipate further reductions in build time.

Layer 5: Dynamic

This final layer, which is still in development, promotes the use of data to make evidenced based decisions. It provides guidance on using advanced analytics, business intelligence, and AI-powered decision support so that countries can learn from one another's experiences.

While the DAK is still quite new, early pilot countries reported to the WHO that they found it very useful in developing a shared language, aligning stakeholders around shared policies and processes, and setting consistent standards—not just for immunisation, but across broader digital health systems within their country. They also recommended that countries work through the five layers sequentially to build linkages across the five layers, enabling in the future an easier integration of the EIR into broader Electronic Medical Records (EMR) systems.

In addition to the observed national level benefits, Nat also shared how following this process can improve regional vaccine certificate checking. An example she noted was how travelers making the hajj to Mecca from countries that had standardized their immunisation records could more quickly cross into Saudi Arabia using the system.

Developing the DAK was a tremendous first step but how is it being used in reality? To find out more, Linked invited countries and implementing partners pioneering its use in Africa and Latin America to share their experiences.

Real-World Implementation: Country Experiences with the DAK

The [second session of the webinar series](#), held on June 11, shifted the focus from global guidance to real-world implementation. Digital health leaders from Peru, Ghana, and Tanzania—alongside partners from GIZ, Digital Square at PATH, and the Pan American Health Organization (PAHO)—shared their insights from piloting the WHO Digital Adaptation Kit (DAK) to update existing national EIRs. Each speaker reflected on what has worked, the challenges encountered and provided their advice for others looking to adapt or scale their Electronic Immunisation Registries (EIRs) using the DAK framework.

Peru: Enhancing Access in Remote Areas

Magdalena Quepuy (Head of the Immunisation Program) and José Pérez Lu (Director General, General Office of Information Technology) opened the session by describing Peru's efforts to modernize its existing EIR. The Ministry of Health, recognizing how fragmented their current system was, decided to create a more accessible, offline-capable app to serve remote regions like the Amazon. They elected to use the DAK and SMART Guidelines with the support of PAHO to determine if it could streamline their development cycle.

Peru implemented the DAK from April to May 2025. The goals for their new EIR were clear: reduce the time from data entry to use; minimize data input errors; enable interoperability across national health systems, linking to their national health records (MINSA); and improve their alert systems to better follow up with the un- and under-vaccinated.

APP OFF LINE DE VACUNACIÓN
2025

Peru began by adapting global vaccine recommendations to national policy (Level 1), then defined user-focused functional requirements to ensure offline usability (Level 2). At Level 3, the team worked to map national vaccine schedules to HL7 FHIR standards, facing integration challenges particularly around adverse event alerts. Level 4 involved implementing and testing the offline app for interoperability with MINSA and automating WHO reporting.

A pilot in five municipalities assessed the new offline app's efficiency and usability in comparison with the previous paper system. While most health workers reported time savings and ease of use, initial variations suggested the need for more training on the digital app to see true health worker benefit. However, follow-up interviews with workers demonstrated broad support for continuing with the new app, especially when backed by proper training.

Ghana: Building a Shared Knowledge Base

Beginning in June 2023, the Ghana Health Services (GHS) collaborated closely with PATH and GIZ under the Digital Innovation in Pandemic Control (DIPC) project to enhance the DHIS2 e-Tracker's immunisation module using the DAK. The GHS wanted to test the DAK to see if it could help them update existing tools, standardize requirements, and strengthen collaboration across the health system. Daniel Adu Asomaning (Monitoring and Evaluation & Vaccine Safety Officer at the Ghana EPI Program, Ministry of Health/Ghana Health Services) shared lessons learned from Ghana's experience in adapting the DAK.

To launch the effort, GHS and partners ran a four-day workshop for selected healthcare staff at all implementing levels to map actual workflows, create local user personas, and develop early requirements. They focused first on mapping their existing processes before commencing work in the DAK. They viewed this early alignment as a critical step in the process, ensuring the adaptation was grounded in real practices rather than led solely by external models. Next, the team validated these artefacts with one another, using shared tools like Excel Analytics and Google Drive to encourage transparency and engagement between national –level and frontline staff in two selected regions.

In Ghana, the DAK informed four key enhancements to their DHIS2 e-Tracker immunisation model: adding automated defaulter tracing and SMS reminders, aligning stock and adverse event workflows with facility-level practices, incorporating child growth and cold chain tracking, and creating a shared language between technical and program teams. Based on the success of this effort in creating a shared knowledge base, Ghana now uses the DAK and documentation developed as a living reference that will inform future updates and has stored tools in a central repository and assigned DAK champions in the GHS to guide its future development, support on-going training and maintain continuity.
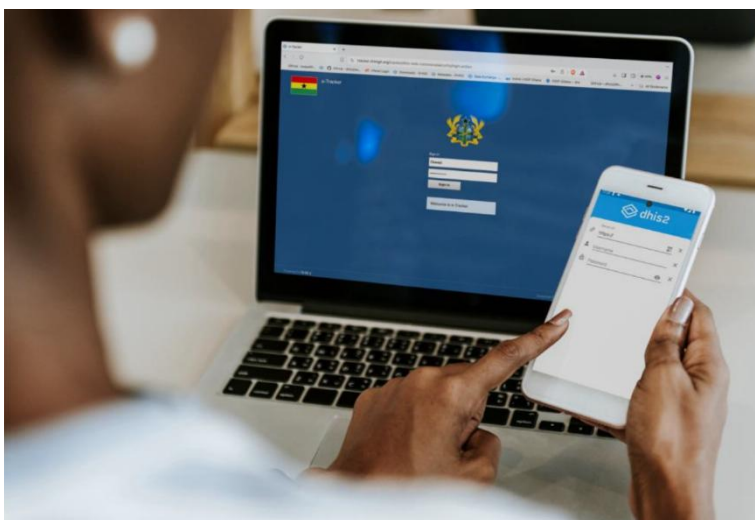
For other countries considering using the DAK, GHS recommended it as a strong foundation for both building and updating EIRs, citing improved alignment and reduced development time. The best practices they recommended others employ included early engagement with frontline workers and integrating developers into the adaptation process from the outset to ensure solutions reflected user needs. They also recommended being thoughtful about how to better involve community-level staff who may hesitate to speak in larger forums, planning for the inclusion of those in currently un-connected areas, and the importance of addressing policy barriers—such as requirements for paper-based records early in the process.

Tanzania: Aligning with National Systems

Erick Kitali, Director of ICT for PO-RALG, shared Tanzania's experience applying the DAK across its 6,000 primary health care facilities. Rather than piloting in isolation, Tanzania aimed to align all 28 national health modules with the WHO SMART Guidelines from the outset.

The process began with a national review of the guidelines, followed by targeted capacity building with local experts. Tanzania then prioritized three key areas for DAK adaptation: retrospective data entry, immunisation, and outreach services. The team mapped existing workflows to DAK components and customized them for the Tanzanian context before testing solutions in selected regions.

Tanzania found the DAK's structured approach useful for aligning with its national health strategy and standardizing data elements across facilities. This reduced duplication, improved delivery, and ensured that partner-supported digital systems aligned with government needs. It also enhanced training for health workers and improved overall data quality.

However, implementation wasn't without challenges. As a global tool, the DAK required significant local adaptation—more time than expected. Familiarity with the DAK was initially low, necessitating extra effort to communicate its value. Erick advised starting with a clearly defined use case, such as immunisation, to lower the learning curve.

He also stressed the importance of involving both technical and program teams from the beginning, something Tanzania hadn't done comprehensively at the start. The country is now working to build broader system understanding, secure dedicated financing earlier, and plan for iterative testing and adaptation. Finally, Tanzania highlighted the need to account for the
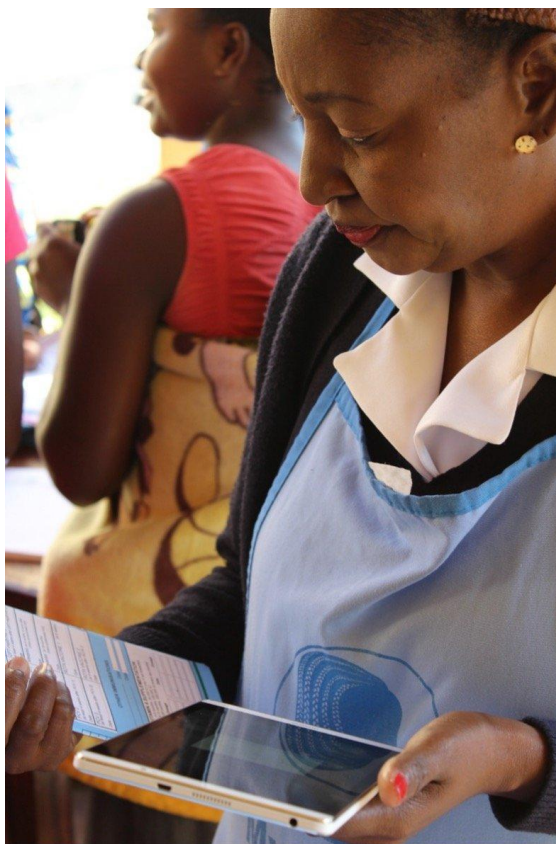
20% of the country that still lacks reliable internet connectivity, an important consideration for equitable rollout.

Resources Available to Help Countries: Partner Tools

As each of these countries demonstrated, the DAK has been instrumental in helping them face key challenges but adapting a global good, like the DAK, can initially take some time. Each country referenced the critical support provided by GIZ, PAHO, PATH, and UNICEF on the ground and credited them in helping them achieve their goals. These organizations were instrumental in each of these adaptations and have in turn developed additional global goods that provide essential tools freely available to countries interested in adapting the DAK.

Central to this support was the Digital Innovation in Pandemic Control program led by GIZ. GIZ shared the programs four areas of support provided to five countries which developed shareable tools that can be used by countries that are updating their national digital health approaches, developing core software modules and building technical capacity. The program also included a measurement component that evaluated the impact of these changes.

Two areas explored in depth in the collaborative session included PATH's work under DIPC, sharing how they expanded on L3 and L4, developing an open-source adaptation using the OpenSRP platform. This tool, now available in English, French and Spanish, can be adapted very quickly by countries who have gone through L1 and L2, further reducing development time. This global product suite includes an EIR mobile app that is developed on the DAK requirements and can be easily adapted by countries using the HL7 Fast Healthcare Interoperability (FHIR) standard. The EIR mobile app further supports health workers with clinical decision making, frontline health workers with patient registration and follow up tasks and shares basic vaccine stock data. This EIR reference application is easily configurable and integrates seamlessly with existing analytics dashboards, DHIS2 and RapidPro messaging platforms.

GIZ also shared a detailed overview on the extensive capacity building resources which they developed including links to specific courses for personnel who would be running the EIR (e.g., project manager, help desk). These are all available on the open Atingi platform and GIZ will be adding future courses there in the coming months. Practitioners can also join their
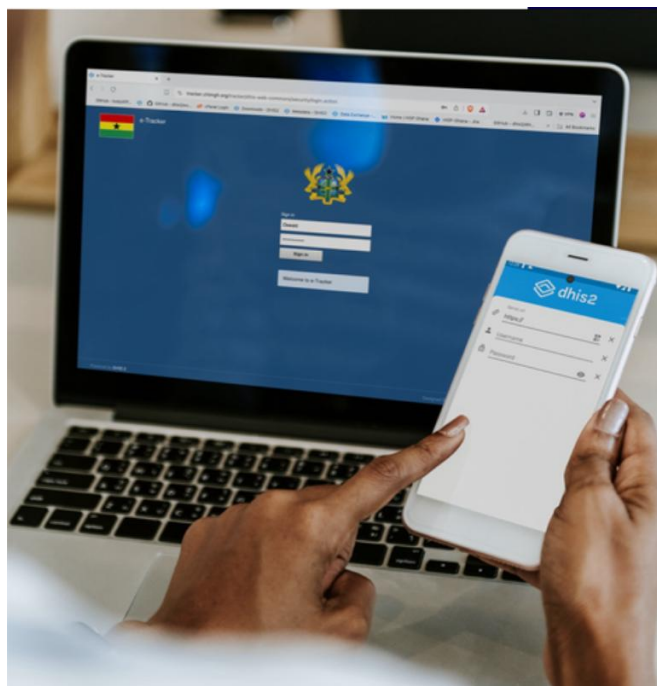
community of practice the eHealth Professional Knowledge Network (eHPKN) which meets every other month to share experiences across the group. On-going efforts include the recently formed Strategic Alliance for ICT Competency in Health (STICH). This WHO/DIPC supported platform provides countries with the ability to jointly co-create and consume new material and deepen peer learning and matchmaking for practical exposure.

All these valuable resources can be found in the full DIPC presentation linked below.

Conclusion

For decades, the global immunisation community has been working to seamlessly integrate digital tools into workflows and use advanced data analytics to drive decision making. As we have seen in the lessons learned from Peru, Ghana and Tanzania, countries are finding that using the DAK and partner tools immediately helped align immunisation policy decisions, streamlined software design decisions, and accelerated deployment of these systems—while building shared ownership and capacity across technical and clinical teams. The WHO Immunisation DAK, these country lessons and the DIPC resources developed are far more than static guidance that will sit on a shelf—they offer NOW a powerful blueprint for modernizing immunisation systems and improving public health delivery everywhere. And as more countries adopt and adapt the DAK and the DIPC developed tools, the community will only continue to learn from early implementers and iterate on what works.

The Linked Immunisation Action Network is honored to bring these key resources to a broader global community—and foster the collaborative learning required to improve vaccine delivery and public health outcomes worldwide.

Relevant Links

- [Peru presentation](#)
- [Ghana presentation](#)
- [Tanzania presentation](#)
- [Partner presentations - DIPC](#)

Links to Partner Resources, Training Courses, and Open-Source Modules

- [WHO's SMART Guidelines for Immunisation](#)
- [Digital Adaptation Kit (DAK) for immunisation](#)
- [Fighting pandemics digitally—DIPC | BMZ Digital.Global](#)
- [atingi | Upskill with free digital courses and certificates](#)
- [Digital Innovation in Pandemic Control](#)
- [Global Immunisation Product Suite](#)
- [Electronic Immunisation Registry: Practical Considerations for Planning, Development, Implementation and Evaluation](#)

Special thanks to our speakers and organizers

- Natschja (Nat) Ratanaprayul, Technical Officer at World Health Organization
- Garrett Mehl, Head of the Digital Health Systems Unit in the Digital Health and Innovation Department of the World Health Organization
- Alain Labrique, Director for the Department of Digital Health and Innovation at the World Health Organization
- Magdalena Quepuy, Head of the Immunisation Program, Peru
- José Pérez Lu, Director General, General Office of Information Technology, Peru
- Daniel Asomaning, Monitoring and Evaluation & Vaccine Safety Officer, Ghana EPI, Ministry of Health/Ghana Health Services
- Erick Kitali, Director of ICT, President's Office – Regional Administration and Local Government, Tanzania
- Tessa Lenneman, Project Leader, Digital Innovation in Pandemic Control Initiative, GIZ
- Monica Amponsah, Technical Advisor, Digital Innovation in Pandemic Control Initiative, GIZ
- Martha Patricia Velandia Gonzalez, Advisor, Pan American Health Organization
- Luciana Rajula, Business Analyst, Center of Digital Excellence, PATH
- Gracey Vaughn, Center of Digital Excellence, PATH