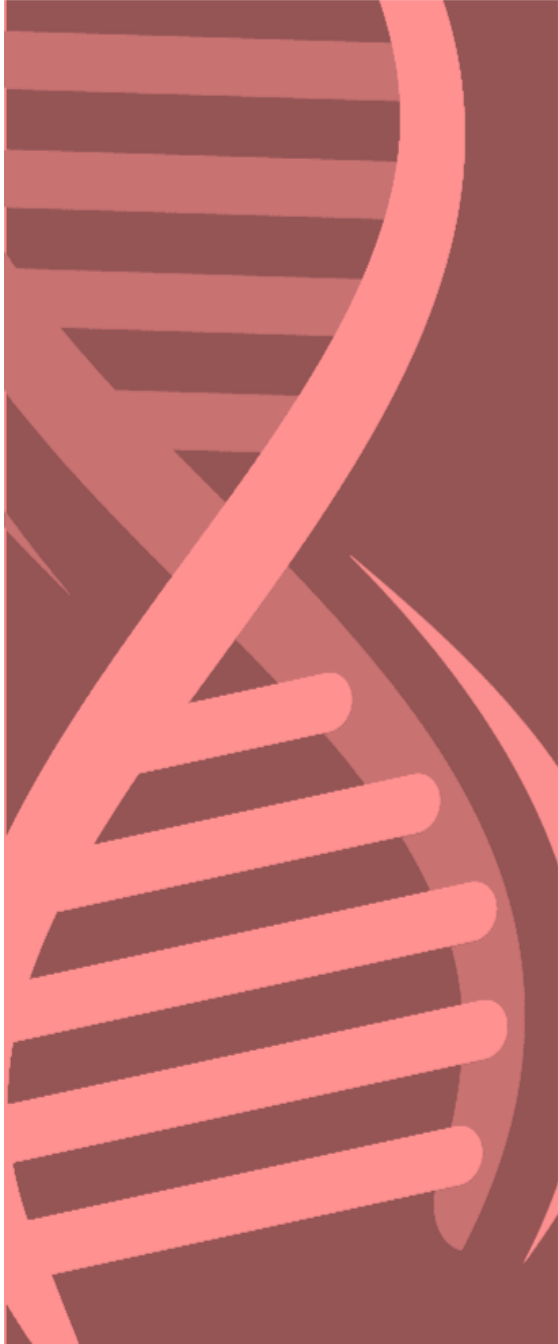




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Towards a Digital Health System Cycle

Learnings from the Digital Pandemic Preparedness Assessment

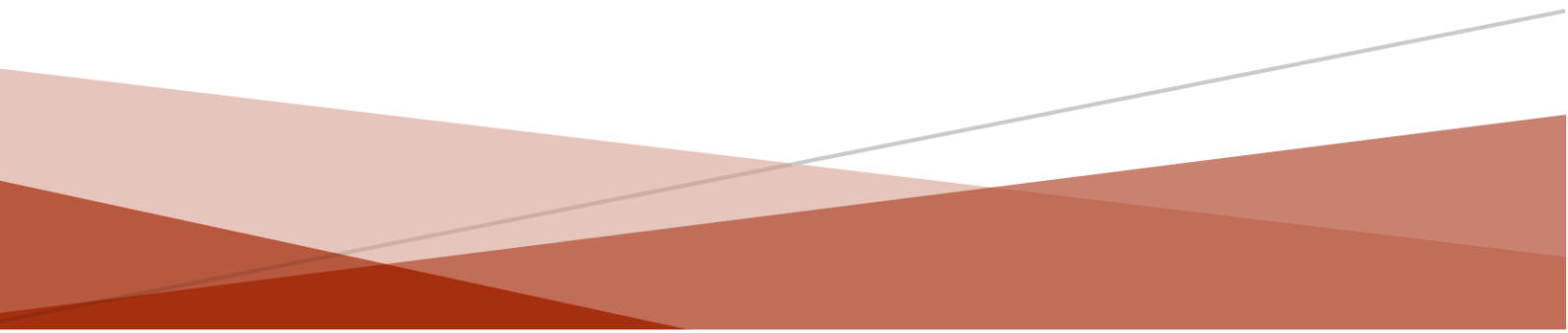


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Acronyms

ACT-A	Access to COVID-19 Tools (ACT) Accelerator
AMC	Advanced Market Commitment
COVAX	COVID-19 Vaccines Global Access
CDC	Centers for Disease Control and Prevention
DICE	Digital Health Centre of Excellence
DIPC	Digital Innovation for Pandemic Control
DP	Development Partners
DPPA	Digital Pandemic Preparedness Assessment
DSqr	Digital Square (PATH led digital health initiative)
EDIT	Early-Stage Digital Health Investment Tool
ECOWAS	Economic Community of West African States
GIZ	German Development Agency (GIZ)
M&M	Map & Match (USAID funded project, implemented by PATH via Digital Square)
URL	Uniform Resource Locators (reference link to a web resource)
USAID	United States Agency for International Development
RPPP	Regional Programme Support to Pandemic Prevention
WHO	World Health Organization
WP	Work Package

1 Background

Digital Pandemic Preparedness (DPP) is becoming crucial not only because paper-based methods have shown their limitations during the COVID 19 pandemic, but also because epidemics require adequate national, regional, and international control measures, strategies, and optimal allocation of available resources. Good governance and a shared strategy are therefore needed to enable the alignment of multilateral partners and integrated digital solutions. This in turn will support public health administration and effectively help partner countries to better manage potential future epidemics. For example, one of the most important lessons (from the Ebola 2014/2015 outbreak) was to start with the software and tools that are already known and used regularly.

It is against this background that GIZ and other international Development Partners (DPs) have sought to identify and map the gaps in the digital health ecosystem of partner countries. GFA consulting¹ was mandated to develop and provide a systematic tool (called the Digital Pandemic Preparedness Assessment (DPPA)-Toolkit) and methodology to identify gaps and opportunities in existing digital solutions in a country to enable the national health system to be prepared to respond to a pandemic. The DPPA-toolkit integrates and builds on the important work of other partners, including USAID's Map and Match (M&M)² database, the EDIT (Early-Stage Digital Health Investment Tool from the Kati Collective)³, feedback from various stakeholders such as CDC⁴, the World Bank, Vital Wave and the Unicef/WHO-led Digital Health Center of Excellence (DICE)⁵.

The first version of the DPPA-toolkit was finalized in October 2021 and piloted until September 2022 in five ECOWAS member countries, namely Côte d'Ivoire, Ghana, Nigeria, Togo and Sierra Leone. The results of the DPPA tool were evaluated and interpreted to formulate scenarios for integrating or increasing interoperability within existing national digital ecosystems. With the DPPA reports, the partner countries and Multilateral Organizations gained relevant insights on how to fill gaps or use opportunities with appropriate digital applications and measures to modernize public health pandemic preparedness and decision making.

The purpose of this report is to provide an overview on the methodology, challenges, opportunities and learnings gained from each country in the course of this pilot. The report does not provide an overall assessment of the solutions proposed, but this and much more detail is available from the country reports themselves. The DPPA toolkit, including the assessment tool and guidance on how to conduct the assessment is also available on the Digital Square Homepage.

¹ [GFA Projects - THEMES AND PROJECTS \(gfa-group.de\)](https://www.gfa-group.de)

² [COVID-19 Map & Match — Digital Square](https://www.digitalsquare.org/)

³ <https://katicollective.com/>

⁴ [Centers for Disease Control and Prevention \(cdc.gov\)](https://www.cdc.gov/)

⁵ [Digital Health Centre of Excellence | DICE \(digitalhealthcoe.org\)](https://www.digitalhealthcoe.org/)

2 DPPA Toolkit Development

2.1 Process

In summary, the approach taken to develop the DPPA tool was to

- Define what **Digital Pandemic Preparedness (DPP)** meant in terms of practical software requirements (i.e. what tools are needed?)
- Draw on epidemic response best practices and digital health standards to **define broad categories of functionality** for DPP-related software packages that constitute a **holistic DPP strategy**. This reduced the number of M&M Use Cases from 17 to 14.
- Identify **component functionalities** of software packages for each category (e.g. *Laboratory Systems > Link patient and healthcare workers to the patient sample sent to the laboratory for testing*)

A total of 14 DPP categories were identified, and the total of the functionalities within each of them was 64. **These 14 uses cases and 64 functionalities** have been developed in coordination with the **USAID M&M use cases** which have been further defined in a framework describing how digital tools can be adapted and used during different phases of an outbreak (Digital Applications and Tools Across an Epidemiological Curve)^{6,7}.

The DPPA tool takes the form of a **multi-sheet Excel workbook**. The **Analysis** sheets are for collection of:

- **Metadata:** concerning stakeholder mapping and engagement of key informants
- **A0.1 - EDIT tool:** Category; Indicator; Type; Score; Potential Actions.
- **A0.2 - Additional and Optional background EDIT data:** internet accessibility and infrastructure; Digital skills; Legal/Regulatory; other comments.
- **A.1 - Articulation of existing DPP Software Packages – M&M Validation:** Tool; Software name; Primary purpose of tool; DPP categories; Funder; Implementer; Government contributions; Proprietary/Open Source; Scale: National or sub-National; Scope/description; URL; Developer; Number of Regions using it; Number of Districts using it; Intended users of the tool; Estimated numbers of users; Estimated number of facilities using it; Hardware; Functionality; Data standards in use; USAID M&M use case; DPP Category; Organisation/ Government Entity Currently Maintaining Tool; Comments.
- **A.2 - DPP Overview:** A table listing the identified tools against the 14 DPPA categories
- **A.3 - Identification of Existing Software Functionalities:** For each tool, the functionalities that it supports within each category.
- **A4 - Qualitative Assessments:** For each tool a qualitative description of the functionalities that are supported.
- **A.5 - Gaps by DPP Category and Functionality:** showing the software packages that are deployed and those that exist but are not deployed.

In addition, there were **Description** sheets provided which gave:

- D1: Definitions of the DPP Categories
- D2: Functionality descriptions for each DPP Category

⁶ https://digital-square.squarespace.com/s/Map-and-Match_Executive-Summary.pdf

⁷ <https://digitalsquare.org/s/DATEC-FINAL.pdf>

- D3: Ranking of the modules
- D4: Overview of the procedural workflow
- D5: Decision tree for tool assessment
- D6: DPP Category Mapping against USAID M&M Use Cases

2.2 Adaptation

The overall process was initially envisaged as a process that could be undertaken within a month in each country. The reality was that during the pilot phase a set of unpredictable challenges were faced leading to some adaption of the DPPA modules (use case / categories), process workflow and implementation timeline. The challenges and learnings will be outlined in the next chapter.

Modules (use cases / categories)

Work on the DPPA toolkit began in late 2020. The first version of the toolkit was published in March 2021. An early user of the toolkit in mid-2021 in Chad reported that it would be easy to take a more modular approach. The data collection and validation workload were high and data collectors may need guidance on what the criteria should be used. As a result of this feedback a version of the toolkit was evolved in which guidance was given on the modules (use cases / categories) to which data collectors should give priority bearing in mind that these were different when the context was one of an outbreak vs. preparing for an outbreak. These are shown for the DPP categories in the table below.

Module	Outbreak	Preparedness
	Outbreak Management (Ranking) Health relevance (in the context of Outbreakmanagement / Pandemic response) - re-emerging or newly emerging disease / health security issue (e.g. CBRN)	Preparedness (pre- & post-outbreak / pandemic) Health relevance (in the context of outbreak management / pandemic response)
Core Priority	CASE MANAGEMENT	SURVEILLANCE
	SURVEILLANCE	DATA ANALYTICS, VISUALIZATION & USE
	CONTACT TRACING	INTEROPERABILITY
	DATA ANALYTICS, VISUALIZATION & USE	ONE HEALTH
	SUPPLY CHAIN & HEALTH FACILITY LOGISTICS	VACCINE DELIVERY
	VACCINE DELIVERY (if re-emerging disease)	LABORATORY SYSTEMS
Extended Secondary Priority	HEALTH WORKER TRAINING	SUPPLY CHAIN & HEALTH FACILITY LOGISTICS
	ONE HEALTH	HEALTH WORKER TRAINING
	LABORATORY SYSTEMS	COORDINATION & OPERATIONS
	VACCINE DELIVERY (if emerging disease)	RISK COMMUNICATION & COMMUNITY ENGAGEMENT
	COORDINATION & OPERATIONS	CASE MANAGEMENT
General Tertiary Priority	RISK COMMUNICATION & COMMUNITY ENGAGEMENT	CONTACT TRACING
	HEALTH FACILITY ADMINISTRATION	HEALTH FACILITY ADMINISTRATION
	INTEROPERABILITY	PROXIMITY TRACING
	PROXIMITY TRACING	

Figure 1 - D3 - Ranking of the modules

The assessment needs to start with the core categories, followed by the extended categories, and completed with the remaining categories. Countries could decide to change the approach depending on their own capabilities. From an epidemiological perspective the rationale was that:

- The **core categories** serve as baseline and encompass what is anticipated to be already available, established and functioning in every country.
- Experience shows that the earlier **surveillance** highlights unusual clustering or reemergence of illness, and the earlier **infection prevention control (containment)** measures start, the better the overall impact.

- The holistic **One Health** approach (including the health of humans, animals, plants and the environmental) along with reliable **data** and their accurate **analytics and use** in informed decision-making are critical (for any disease outbreak).

However, although this approach offered a way to manage the time spent on gathering key data, when it became evident that the number of systems being reviewed was becoming too small to provide a reasonable assessment, it was not used (though it still offers a viable way of prioritising work).

Workflow

The original workflow was divided in three phases shown in the flowchart below and which is an extract from the Toolkit interpretation guide.

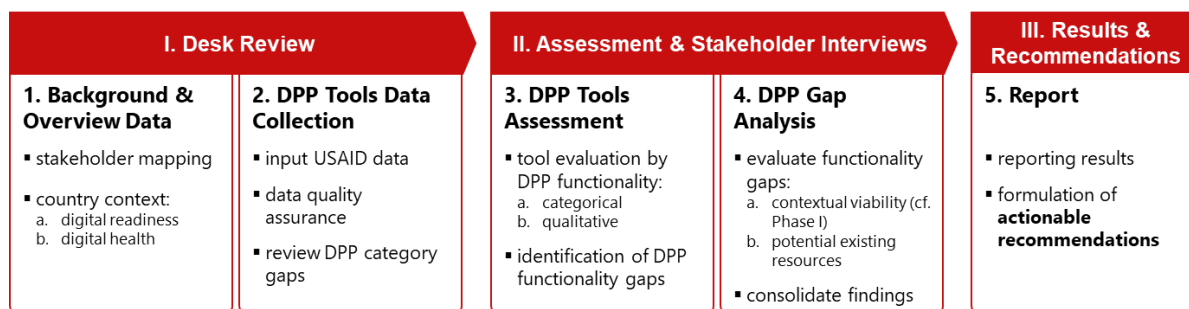


Figure 2 - original DPPA Toolkit Workflow

As the DPPA process engaged with the **MoH and stakeholders** it became increasingly clear that the original intention of providing **actionable recommendations towards specific software** was going to be problematic. More important would have been to understand what the state of the **digital health ecosystem** was and what is expected from the stakeholders in the ecosystem.

Therefore, to advance and ease the assessment process, the approach taken was to structure the assessment in a set of **5 sequenced work packages** that guide the consultants through the process **at national level only**. After preliminary country engagement work (WP1) and qualitative assessment of the digital health ecosystem (WP2), using the Map and Match data as a starting point and validating it in the local context (WP3), the existing tools landscape needs to be mapped (WP4) and interpreted in regard to Opportunities, Gaps and recommendations (WP5).

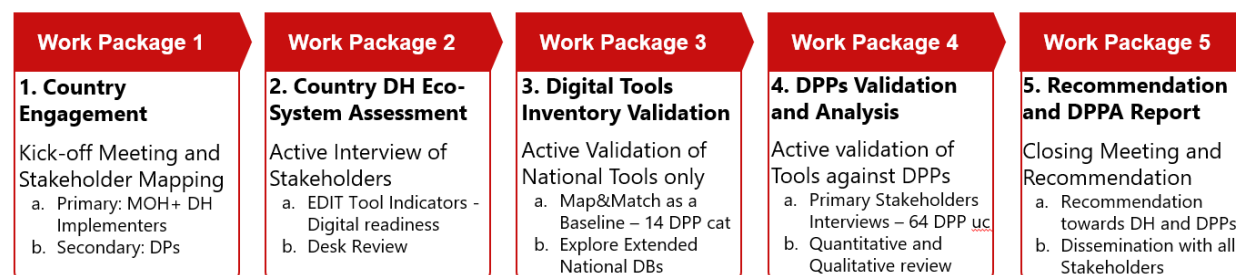


Figure 3 - adapted Workflow for the pilot phase

Timeline

The timetable was initially programmed assuming that maximum 4 weeks to complete the assessment would be enough.

	Week 1	Week 2	Week 3
1 Preliminary Analysis			
1.1 Online kickoff meeting with contractor, GIZ SP/Health, country GIZ health representatives and experts to discuss scope of work, country context and identify additional stakeholders for input relevant to the assessment	█		
1.2 Mapping of relevant stakeholders	█		
1.3 Online meetings with public health authority officials (Directors - Primary Health Care and Disease surveillance) to get buy-in for assessment, workshop scheduling etc.	█	█	
1.4 Online meetings with additional relevant stakeholders as required, workshop scheduling etc.	█	█	
1.5 Desk review of existing country epidemic response readiness, COVID-19 response status, digital development status etc	█	█	
2 In-Country Activities			
2.1 Meeting with GIZ health representatives and experts in partner country to explain assessment, discuss implementation, and identify additional stakeholders for input relevant to the assessment		█	
2.2 Completion of stakeholder mapping		█	
2.3 Meet with public health authority officials for introductions to technical team		█	
2.4 Follow-up meeting with technical team for preliminary understanding of tools and functionalities which are already in-use		█	
2.5 Meet with identified stakeholders		█	
2.6 Workshop with public health authority technical managers and IT personnel, and other stakeholders to map existing digital health environment and assess which additional tools would add value (i.e. which tools and functionalities are already deployed as per assessment framework? Which functionalities/needs are not being met? Which solutions could apply given contextual viability? Analyse tools for contextual viability, i.e. in relation to epidemic progression, digital readiness and the health system capacities)		█	
2.7 Mission closure meetings with GIZ, stakeholders etc		█	
3 Assessment Report			
3.1 Follow-up interviews and further desk review (as required)			█
3.2 Development of strategic recommendations as a baseline for strategic action plans			█
3.3 Development of report			█
3.4 Draft report submission to GIZ			█
3.5 Finalisation of report			█

Figure 4 - Initial timeline for the development and pilotisation of the DPPA Toolkit

This became defunct as it took on average about 9 months to finalise the assessments in each country.

No.	Resp.	Activities	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	...
0		DPPA Tool Development & Adaptation										
0.1	CON	Draft of DPPA Toolkit	█									
0.2	CON/GIZ	Training and Test	█	█								
0.3	CON	Review and Adaptation of Toolkit									█	
1		WP1 - Contry Engagement (5 countries)										
1.1	CON	Desk review country context		█								
1.2	CON	Stakeholders mapping		█								
1.3	CON/GIZ	Kickoff meeting			█							
1.4	CON	Interviews with stakeholders (5 countries)			█							
2		WP2 - DH Eco-System Assessment										
2.1	CON/GIZ	Completion of stakeholder mapping			█							
2.3	CON	Interviews with stakeholders			█	█	█					
3		WP3 - Digital Tools Inventory (5 countries)										
3.1	CON	M&M Baseline Validation				█	█	█				
3.2	CON	Extended Databases review				█	█	█				
4		WP4 - DPP functionalities Validation (5 countries)										
4.1	CON	Desk Validation of Baseline against DPP functionalities				█	█	█				
4.2	CON	Interviews with stakeholders				█	█	█				
5		WP5 - Recommendation and DPPA Report (5 countries)										
5.1	CON	Formulate recommendations for DH Eco System and for DPP Tools							█	█	█	
5.2	CON	Validate recommendations with the Stakeholder							█	█	█	
6		DPPA Report Dissemination (5 countries)										
6.1	GIZ	Stakeholders mapping									█	
6.1	CON/GIZ	Closing meetings and next steps									█	█

Figure 5 - Adapted timeline after Pilots

3 DPPA Piloting

Evidently the process of conducting the DPPA took much longer than anticipated at the start of the programme. The explanations for this vary between country, but there are some generic lessons to be learned based on the challenges that were faced.

Since the workflow was divided in a set of 5 sequenced work packages, it was easy to capture the challenges accordingly and reflect them within the work package and in the country context.

3.1 Country Engagement

The BMZ (Global Health Department) was very instrumental in terms of creating entry points in the partner countries. It issued official information letters and emails through the respective country offices to obtain approval of the responsible government bodies and key stakeholders in the health sector. The overall process took three months to engage all five countries.

Difficulties in getting endorsement from the start to the end

In most countries, it was possible to introduce the DPPA assessment procedure (and in kick-off meetings) by outlining the benefit that the DPPA outcomes would bring to the country's digital health strategies.

The kick-off meetings varied in the numbers of stakeholders attending as they were often parallel ongoing meetings. In these cases, the option of piggybacking onto another meeting was chosen, which reduces the time frame allocated to the topic. It was also difficult for government bodies to commit to maintain their full engagement to regular meetings as they were not clear how the implementations and recommendations of the results was going to be funded.

Based on the outcome of the meeting and recommendations from the participants, a stakeholder mapping was done to obtain the stakeholder landscape. After the kick-off meetings, it was sometime difficult and time-consuming getting access again to the government bodies and relevant decision-makers that were listed in the stakeholder's landscape. Getting the right sequence of introductions to the relevant decision-makers was a huge burden for the consultants particularly in countries where GIZ staff were not available or actively working in the Global Health sector.

When the DPPA's were concluded, final workshops were held to review the findings and receive final comments. In the meantime, the stakeholder landscape had changed, which made the prioritisation session of the results difficult.

Difficulties in finding and retaining consultants

The core DPPA process was managed from outside each country. The first point of contact with a national consultant for the GFA consulting was done based on recommendations of GIZ and KFW staff in-country. It turned out that the network of national digital health experts is very limited.

Even if several experts were interested in conducting the DPP assessment, their availability to work on such an intensive assignment was highly constrained. Private, unexpected circumstances also hindered the consultants' availability. To these challenges are added those of connectivity, power supply, missing MS Office Licences etc., which slowed down the project activities.

3.2 Eco-System Assessment

A **substantive part of the DPPA** is to analyse the status of the **digital health ecosystem**. The DPPA toolkit offers two sheets to capture the basic information about the digital health readiness of the country. The **DPPA sheet A0.1 has all 79 indicators from the EDIT tool** and the **DPPA tool sheet A0.2** offers further **additional and optional background indicators** for the country eco-system.

The EDIT tool defines a set of 79 scorable indicators, grouped in to six blocks (human capacity, investment and financing, data capture and use, infrastructure, standards and interoperability, and governance and policy), that help describe the digital health landscape at the national level and identify areas that require specific digital related improvements. It has been integrated as an essential part of the process of assessing the country's readiness for digital health. As a means of assessing digital health readiness scores the EDIT tool has proved to be very useful, and a great deal of qualitative information was also gained.

In most of the countries, the outcome of the eco-system assessment was that Digital Health Strategies need to be developed (costed and funded).

Selecting, coordinating, and engaging the interview partners

The EDIT tool provided more user-friendly granularity than the Global Digital Health Monitor⁸ available at the time. Since the EDIT tool is a self-assessment tool, it was important to get the right and relevant stakeholders in the landscape to fill the forms. The assessment had to be a one-off exercise and not part of a regular process, as there was no forum of stakeholders where programmes such as DPPA could be presented more in depth for review. The kick off meetings provided a useful forum, but engaging the identified stakeholders was a difficult exercise and the dangers of siloed assessments were noted.

It was also a challenge to identify the right way to interview the stakeholders. In some cases, the interviews were done 1 on 1, in other cases a group setting was used, or the EDIT form was emailed for respondents to complete and return. The diversity in data collection slowed down the assessment process but offered the flexibility that the circumstances required.

Missing coordination of partners interested in Eco-system assessments

DPs have different project life cycles and always request a sort of ecosystem landscaping that needs to be conducted right at the beginning of the project's phases, and the stakeholders that are being interviewed are often the same. It was not surprising that the local DPPA consultants reported that during the interviews a significant level of fatigue that was observed.

An early user of the toolkit warned about the workload of the data validation process and that the collectors may need guidance on what **criteria** they should be prioritise and used.

The **M&M** is an **USAID** funded project which conducted by Digital Square (DSqr) and which provides a **detailed** landscape of existing, adaptable digital tools used at scale in 22 countries. Some of these tools have already been adapted for COVID-19 or demonstrated opportunities to be adapted for COVID-19 use cases including vaccine planning, delivery, and monitoring. For this process, DSqr used the tools captured in the WHO Digital Health Atlas (DHA) as a starting point and completed the dataset locally with the respective government representatives and bodies. These tools sets have been subsequently matched to potential use cases for COVID-19 and broader pandemic management and reuploaded in the backend of the WHO DHA⁹.

⁸ [Global Digital Health Monitor](#)

⁹ https://digital-square.squarespace.com/s/Map-and-Match_Executive-Summary.pdf

Without the M&M as a baseline database, the process would have been prohibitively time-consuming. However, there are some other sources of available data and information concerning Digital Health Tools and Technologies. For example, UNICEF have been mapping digital tools and technologies in countries¹⁰ and more detailed studies on IVR¹¹, and immunization data¹².

Accuracy of the baseline data base

In the **DPPA tool sheet A1**, the consultants were to articulate the existing Software Packages that could be used to address DPP overarching use cases (categories) by validating **criteria** such as the **Tool name; Software name; Primary purpose of tool; DPP categories; Funder; Implementer; Government contributions; Proprietary/Open Source; Scale; National or sub-National** etc...

The validation process of the baseline database involved conducting interviews. It turned out that a large amount of the information about the tool were not accurate as the M&M information were updated only at the level of the government bodies. For example, in the case of Nigeria, 42% of original M&M database of digital tools were defunct after validation.

- **In Togo**, M&M had a total of **17 software tools as a baseline**.
- **In Sierra Leone** it was 44 software tools, and **all were still in use**.
- **In Ghana**, from **62 software**, **17 software tools were assessed** for this exercise and another 21 were identified to be decommissioned or not in use. The assessment also revealed that 11 software tools were not relevant to pandemic preparedness and 12 were deemed to be useful for pandemic preparedness but relevant stakeholders for interviews could not be identified.
- **In Nigeria**, there were **159 software tools**, but of **these 28 (18%)** were not relevant to pandemics, and 67 (42%) were defunct. **64 tools were applicable** for the DPPA assessment representing 40% of the Map and Match dataset.
- **In Côte d'Ivoire**, from 29 tools, 5 tools were derived from the Directorate of Informatics and Health Information database, and 2 from the literature review, making a total of 36 that were reviewed.

Challenges with the quality of the data collected

The second step after validating the baseline is to consider **extending the list** of available solutions before starting the assessment. Therefore, after making sure that the baseline database contained a minimum of reliable software tools, the consultants completed the database based on their knowledge of the national digital health eco-system. This process needed to be undertaken locally together with the tools' implementors (who were usually not among the stakeholders identified on the project kick-off).

The verification of the data was a process that also took considerable time as individual judgements had to be made concerning the value of the criteria for each dataset. The values needed also to be cross-checked against the various responses. In practice, for example, most countries did not collect data on the number of Districts the tool was being used in, or the types of users and their numbers, or the facilities using it. Whilst the gaps in the overarching DPP categories use were identified, there was not time to conduct Stakeholder interviews on deployed software packages and associated challenges for each DPP functionality.

¹⁰ [Mapping of Digital Health Tools and Technologies in Countries - Google Sheets](#)

¹¹ [IVR providers by country - Google Sheets](#)

¹² [DPGs Immunization Delivery Management Systems \(no emails\) - Google Sheets](#)

3.3 DPP Sub-categories Validation and Analysis

The updated and extended databases of tools automatically generated a **table with all available DPP functionalities that could be considered as opportunities** in the country. These also populated the A3 and A4 sheets of the DPPA toolkit. The **A3 sheets** aimed at quantifying the databases of **tools** in a simple coding system (**1 - Deployed, 2 - NOT deployed and NA for Unknown**) against the **DPP Functionalities**. In the **A4 sheet tools qualifications of findings** could be written to describe the implementation of a tool for a specific functionality.

The results of the quantitative evaluation done in **A3 sheets** were observed in the **A5 sheets**. DPP functionalities that could not be matched to a **tool** were **marked red as a Gaps**.

Evolving DPP use cases and country context

In all the five countries, proximity and contact tracings were the first gaps that were identified. Microplanning, Interoperability, and capacity building followed. Subsequently requests were made by the **ministries to review the use cases and adapt them to the domestics' challenges**. Uses cases such as Telemedicine, scenarios around One-Health and Interoperability were added.

Managing operations in multiple, heterogenous settings

Countries differ considerably in their geographies, and this had an impact on how the process was managed. Also, leeway was given to pursue different approaches. For example, in Sierra Leone, seven (7) districts out of a total of 17 were selected to presumptively get a representative sample of epidemiological factors, terrain/access, stage of deployment of digital solutions and experience. This selection was made by the ICT Manager at the MoH, who oversees all digital health deployments in the country. The Monitoring and Evaluation Officers at the districts were designated as the participants to provide the necessary input into the study survey. These officers were each then sent an email explaining the purpose of the study with the DPPA Tool attached, together with clear instructions on how to complete the relevant sections i.e., tabs A3 and A4 of the tool. This approach showed that data collection for the DPPA tool can be undertaken in a decentralised way. But in larger countries, such as Nigeria, this approach is less feasible, and a centralised approach was taken. Without the restrictions of time, however, arranging data collection within each of the States of Nigeria would have been an option to consider.

3.4 Recommendations and reports

Initially, the aim of the DPPA assessment was to recommend specific tools that would be recommended to be further implemented or leveraged. But during the project there was a shared realization that it would be more helpful if the recommendations were not system specific as it might result to a conflict of interest from different stakeholders.

Based on the analysis of the **Digital Health Ecosystem, the EDIT assessment and DPP functionalities, two set of recommendations** were formulated to support coordinated donor activities targeted towards country-level Digital Health strategies. **Recommendations were made to improve foundational Digital Health issues and to address validated gaps from the DPP opportunities for country-specific pandemic readiness** by leveraging existing software or implementing new ones.

Report Formats / Lack of costed and funded digital health strategies

Though guidance was given on report formats in the training, they were revised. The initial feedback on Togo (the first country to start producing a report) indicated that more structure was needed. This was developed over several iterations, and then this common structure was used by the other countries in developing their reports.

In the five countries, the lack of up to date and costed digital health strategies hampered the overall assessment. Unaddressed in the original DPPA was the desirability of **costing** the recommendations. As the reports and the recommendations began to be shared there was a request in some countries for recommendations to be costed and prioritised. In Ghana, for example, there was an attempt to engage with DPs to do just this. However, this process needs to be developed further in future versions of the DPPA, drawing on work about pricing digital health tools¹³ and digital health investment¹⁴.

- **In Togo**, the **recommendations** were to extend the functionalities of the Health Management Information System (HMIS) in Togo to the online training of health professionals, scale the software already used by the Ministry for the management of human resources in health and acquire other software packages for the management of financial resources and the "One Health" approach.
- **In Ghana**, the **recommendations** were for the Ministry of Health to update the current eHealth strategy in the light of pandemic preparedness and recent innovations in the digital health ecosystem. In addition, a new data warehouse is required to support collection, transformation, analysis of (pandemic-related) data and dissemination of evidence-based reports. Development partners could support the MoH to develop a costed roadmap with key priorities for implementation in the short to medium term (1-5yrs). There was also an opportunity for MoH to partner with GIZ to support identification of key areas for an accelerator program to develop an innovative application to enhance the country's preparedness for future pandemics. MoH needed to be supported in the development of the Master Patient Index platform using the National ID number and integration of the national data warehouse with the lab information system.
- **In Sierra Leone**, the **recommendations** concerning the major gaps included strengthening mobile phone communication for contact tracing and digital tracking, improved monitoring and management of animal, environment, and human disease outbreaks (One Health).
- **In Nigeria**, the **recommendations** were to address the gaps and deficiencies identified at the ecosystem level, as well as towards improving digital pandemic preparedness. These included accelerating the release and implementation of the Nigeria Health ICT Framework (2022-2027), strengthening One Health initiatives, and developing a healthcare resource discovery tool. With these recommendations, the Federal Ministry of Health will be able to prioritise the most urgent or important items for the country and engage partners to obtain technical or financial support.
- **In Ivory Coast**, the **recommendations** were to develop a long-term plan for financing the digital health system and its strategic plan for digital health (essential documents to mobilize resources from partners and the government). There will also be a need for a coordinating body and a framework document that clearly defines roles and responsibilities for digital health functions and activities, as well as the training of women's health personnel. In addition, attention should be paid to the advantages and disadvantages of open-source digital tools compared to proprietary digital tools.

¹³ [FIND | RFP Pricing-access framework for digital tools and applications in low-and-middle-income countries \(finddx.org\)](https://finddx.org/)

¹⁴ [WHO Digital implementation investment guide DIIG R3.pdf \(path.org\)](https://path.org/)

Organizing a Dissemination Workshop

It took **more than 9 months in all the five countries to complete the DPPA**. As already stated above, by the time the DPPA had concluded, the stakeholder's landscape had changed. **The list of stakeholders to be invited were obsolete** and needed to be updated. The same problem with parallel ongoing meetings occurred and the unwelcome option of **piggybacking onto another meeting needed to be reused**.

In Ghana out of 25 stakeholders invited 6 were physically present and 10 attended virtually. In Togo, out of 20 stakeholders, only 14 were physically present and 4 attended virtually. In Sierra Leone, there were 3 bilateral meetings between the consultants, the GIZ country advisor and the representative's government bodies. In Côte d'Ivoire and Nigeria, the representatives of the ministry organized virtual meetings with no additional participants other than the consultants and the GIZ team.

The agreement was in all the 5 countries, to **organize other meetings after some time to reassess the state of changes to be able to compare and monitor the potential improvement** that the countries have made towards pandemic preparedness.

4 Opportunities

4.1 Coordination with Projects and Multilateral Organizations

From the development, piloting, and evaluation of the DPPA, there were opportunities that emerged at all levels for the ministries and partners involved to partner and collaborate. The following are few examples of opportunities that were available.

Digital Innovation for Pandemic Control

The Digital Innovation for Pandemic Control (DIPC)¹⁵ project is a GIZ Flagship Project that aims at strengthening digital health systems in ACT-A recipient countries.

The ACT-A is a historic beacon of international solidarity and joint action to combat the global pandemic. Supported by Germany as the second largest donor, the COVAX Advanced Market Commitment (AMC) is responsible for the international distribution of vaccinations within ACT-A. However, once the vaccines have arrived at the national ports, the recipient countries assume responsibility for the distribution to the respective risk groups. This task represents a major challenge for many countries and in response to this the BMZ commissioned GIZ to carry out the Digital Innovation in Pandemic Control (DIPC) flagship project, which aims at strengthening the digital health system in COVAX recipient countries.

The DIPC captured the recommendations of the DPPAs in 5 countries ECOWAS and COVAX countries (Côte d'Ivoire, Ghana, Nigeria, Sierra Leone and Togo) as part of its business process to generate proposals that would be addressed in Accelerator programs, where selected winners are funded to provide digital solutions required by the countries. The WHO/UNICEF DICE also intend to coordinate DPs support around the recommendations that were not addressed by the Accelerators. The diagram below summarises the programme.

¹⁵ [Digital pandemic control | BMZ Digital.Global \(bmz-digital.global\)](https://www.bmz-digital.global/)

digilab Digital Innovation in Pandemic Control (DIPC)

GIZ Digital Pandemic Preparedness Assessment (DPPA)	GIZ x WFP Digital Pandemic Control & Vaccination Accelerator Program	Donor Coordination Group Digital Health Centre of Excellence (DICE)
<ul style="list-style-type: none"> • Background: DPPA developed in SV Health in partnership with USAID to capture digital-health tool map of a country & region • Implementation: Implementation of DPPA in 5 high-risk countries • Partners: External consulting (e.g., Digital Square) in alignment with Global Donor Group (incl. BMGF) 	<ul style="list-style-type: none"> • Background: Need for targeted promotion of digital health tools identified by DPPA, digilab & further partner • Implementation: Implement Accelerator in collaboration with WFP Innovation Accelerator based on DPPA findings. Financial and technical support to 5-10 winning initiatives with focus on scaling • Partners: WFP, GIZ Partner and external structure 	<ul style="list-style-type: none"> • Background: Positioning BMZ/GIZ as a digital pioneer in the context of the global donor network activities • Implementation: Joint conceptualization and establishment of a global governance and advisory team (Digital Health Center of Excellence DICE) to consistently promote digital tools in pandemic response and vaccination roll-out • Partners: UNICEF, BMGF, WHO, World Bank, USAID, CDC, EU, GIZ

WBG

In Sierra Leone, by the time the DPPA work began the World Bank Group (WBG) were already partway through a programme of work that was assessing digital preparedness for pandemics, albeit using a much more qualitative approach. There were several joint meetings to ensure overlap of effort was minimised.

In Ghana, the WBG leveraged the GIZ DPPA assessment to support their new program (primarily supporting Primary Health Care and the adoption/expansion of the networks-of-practice model) which had some digital health support elements around telemedicine and data use. It avoided duplication in conducting an additional digital health landscape assessment. The WBG conducted some of the “further research needed” such as an economic evaluation of the telemedicine delivery model or more bespoke research needs to further assist their client and the DP consortium.

RPPP in Nigeria, Ghana and Sierra Leone

The regional project Support for Pandemic Prevention in the ECOWAS Region (RPPP)¹⁶ is a BMZ funded GIZ Program which helps ECOWAS member states implement selected mechanisms for disease control in accordance with the International Health Regulations. The RPPP collaborates with Partners such as, the West African Health Organization (WAHO) and the newly established Regional Centre for Disease Control and Prevention (RCDC) to assist the ECOWAS Commission. Focus countries in the RPPP are the following countries Burkina Faso, Guinea, Liberia, Mali, Sierra Leone, Togo, Nigeria, and Ghana .

The RPPP program officers supported in Ghana, Sierra Leone, Nigeria and Togo with the kick-off meeting and further communication with the government.

ProSanté in Togo

ProSanté¹⁷ is a BMZ funded bilateral GIZ Project which aims at strengthening the MoH to support the uptake of population's use of health services. To this end, a comprehensive communication strategy is being implemented. A focus is information on sexual, reproductive rights and support for the MoH in planning its human resources up to the year 2030.

¹⁶ [Supporting pandemic prevention in the ECOWAS region - giz.de](https://www.giz.de/pressroom/2020/06/Supporting_pandemic_prevention_in_the_ECOWAS_region_-_giz.de)

¹⁷ [ProSanté: strengthening the health system - giz.de](https://www.giz.de/pressroom/2020/06/ProSant%C3%A9:_strengthening_the_health_system_-_giz.de)

ProSanté has been very supportive in all the communication with the MoH throughout the duration of the DPPA. For the new phase ProSanté used the DPPA report to formulate areas of work related to digital health that would cover the whole program implementation.

KfW in Côte d'Ivoire

KfW¹⁸ is the German Development Bank. It has been helping the BMZ to achieve its goals in development policy and international development cooperation for several partner countries. In Côte d'Ivoire, KfW has been working together with the GIZ to support the Ivorian partners the sustainable economic, touristic and health sector. The KfW projects support family planning and HIV prevention with projects that help to reduce the number of unwanted pregnancies, ensure medically assisted pregnancies and births, and improve mother-child health.

KfW's has been very supportive during the Kick off Meeting and serving as a connection to the MoH.

4.2 Digital Health Networks

HELINA

Health Informatics in Africa (**HELINA**) is a Pan-African Digital Health Association that has existed since 1993. The African Region Arm of the International Medical Informatics Association (IMIA) aims to promote education and research in health informatics in Africa and to implement ethical, modern, and evidence-based health informatics solutions to improve access to quality healthcare in Africa.

During the last few years, HELINA has expended its area of work by engaging the private and political sector in Digital Health. Now HELINA is helping digital health practitioners to engage with government bodies to converge knowledge management and priorities to fit the domestic context, including those that arise from DPPA recommendations.

AeHIN

AeHIN¹⁹ is the Asia eHealth Information Network (AeHIN). It is a collaboration of digital health advocates from South and South-East Asia committed to promote interoperability for better health. To promote a vision of a strengthened interoperable digital health ecosystem for better health in Asia, AeHIN has been promoting learning, resource sharing and knowledge exchange to strengthen digital health through the networking approach in practical ways. It has also proved in practice the value of the "Convergence Toolkit" developed by the Asian Development Bank²⁰ to run workshops that help clarify how stakeholders, including policy makers, implementers, development partners, technical experts, and users to achieve shared vision of the country's digital health development plans.

¹⁸ [Côte d'Ivoire | KfW Development Bank \(kfw-entwicklungsbank.de\)](https://www.kfw-entwicklungsbank.de)

¹⁹ [ABOUT AeHIN – AeHIN \(asiaehealthinformationnetwork.org\)](https://asiaehealthinformationnetwork.org)

²⁰ [Digital Health Convergence Meeting Tool Kit | Asian Development Bank \(adb.org\)](https://adb.org)

4.3 New opportunities for developments partners at country level

There were opportunities for the MoHs to partner with GIZ to support identification of key areas for an accelerator program to develop an innovative application to enhance the country's preparedness for future pandemic.

New Domestic Use Cases

The domestic needs were articulated as much more relevant for pandemics preparedness, and these were not even captured in the initial DPPA use cases. Further recommendations, as recognised in Ghana for example, were that a MoH needs to invest in the development of data science skills and cloud infrastructure, as well as developing new business model and infrastructure for telemedicine.

Variety of tools and existing frameworks

It was also clear that past pandemics and the current pandemic had offered opportunities for catalytical funded piloted tools and methods that have not been properly documented but well known at country level. Therefore, the feedbacks and Appel to DPs at country level were always to allow as much flexibilities as possible to allow meaningful and impactful implementation.

5 Learnings

The major lesson to be learned is that **digital pandemic preparedness is just one aspect of a digital health system**. The Covid-19 crisis forced attention on what should be a matter of routine – keeping current the knowledge of what digital systems and functionalities are working to improve the health system. But to institutionalise a process to do this – **to develop and improve a continuing cycle of digital health assessment requires resources that most LMICs do not have**. Or at least the resources that are available are not **co-ordinated** in such a way **that they enable LMICs to make best use of them**.

There continues to be little co-ordination of the aspects of digital health systems of interest to **DPs themselves** and making that easily available. Also, the reality is that **digital health strategies** are **not kept up to date** with **knowledge from external or internal monitoring systems** that report on the availability and functionality of the tools in use. Also, MoHs do not have **information units** established to address these issues, so assessing the digital aspects of emerging crises will remain difficult to do.

What are **the resources that are available** and can be used by countries?

5.1 Ownership at Country Level

Initially unstated was the requirement that **ownership** of the process should remain in countries. The need for this was underlined in different ways during the DPPA and could have been stated more clearly at the outset and in the documentation shared.

Every country has a **MoH** with the **authority to make policies concerning health, and digital health**. In many countries, such as Sierra Leone, there is increasing attention being given to improving **“Whole of Government“ initiatives**, and some have established **governance arrangements that include many other digital issues** that affects infrastructure and

standards resulting in a **Central Government Unit for Digital Health**. Countries such as Nepal²¹ and Egypt²² have been supported by USAID to have a **Digital Ecosystem Country Assessment**. It is also likely that as more attention is paid to One Health issues that **more cross-sector working** is going to be required.

A **country level Digital Health Unit** would be able to facilitate the development of improved coordination between DPs, researchers, and others. It would gather the evidence that substantiates the benefits of pooling resources (including secondments of people) in a managed way. With **converged donor support** much more can be done **e.g. Team Europe Initiatives**. There would also be the scope for more active participation in the high-level working groups that develop global information policy, **e.g. the Health Data Collaborative**.

In summary, countries need:

- ✓ **A Digital Health Unit** to coordinate and drive the country's approach to digital health.
- ✓ **National consultants and DPs contributions** to support the national digital health agenda.

5.2 Digital Health Eco-System and Foundation Management

Every country is expected to have a current **Digital Health Strategy**. Guidance on this has been provided by the WHO since 2012. These Strategies need to be kept up to date. At present, of the five countries studied, only Sierra Leone has a Strategy that is less than five years old.

Whilst countries need to invest more in (digital) health, a key task for MoHs is to invest in the structures (people and processes) needed to coordinate and manage the process of development and implementation of **digital health policy and strategy** across the relevant sectors.

For example, with a **strong data use ecosystem** in place, and **interoperability between systems** when crises such as Covid-19 hit, countries can pivot quickly to respond to them (as Malawi and Vietnam, for example, did in the COVID-19 crisis).

Another fundamental aspect is capacity building in digital health. Training courses are conducted via a range of **capacity building networks** and **resources** that are available for digital health practitioners at national or local level. Some are available **from the MoH of a country, some supported by DPs such as the WHO²³**, and others supported by **Regional and Continental networks, such as HELINA²⁴, AEHIN, Regenstrief Institute²⁵ etc...** In many respects their task is to help improve the use of data and learning.

To ensure a strong foundation for DH ecosystem, countries need to have:

- ✓ **Digital Health Strategies that are costed and planned and**
- ✓ **Be able to adapt Strategies and policies to emerging Challenges and Opportunities.**

²¹ [Nepal Digital Ecosystem Country Assessment | U.S. Agency for International Development \(usaid.gov\)](#)

²² [Digital Ecosystem Country Assessments | Digital Strategy | Technology | U.S. Agency for International Development \(usaid.gov\)](#)

²³ [WHO-ITU Digital Health Leadership training | ITU Academy](#)

²⁴ [HELINA – Health Informatics in Africa – The Pan African Health Informatics Association and the African regional body of the International Medical Informatics Association \(IMIA\).](#)

²⁵ [The Regenstrief Foundation - Regenstrief Institute](#)

5.3 Knowledge Management Strategies

A corollary of the time taken to manage the progress in the five countries was that other areas of work envisaged in the overall programme were not taken forward. There was also **no engagement with ECOWAS** with a view to develop a regional framework based on the lessons learned at national level. This framework would have reflected **the lessons learned at national level and supported the sharing of knowledge across borders** in the region.

How application systems that are in use generate the **data and information** that inform the whole health system remains largely unknown, and yet improving them from a technical and training point of view is vital. The ways in which “accelerating country-led digital health transformation for data use to improve health outcomes” is the subject of a research project led by PATH and Cooper/Smith²⁶ and is reinforcing the need to understand data use as part of a digital health ecosystem.

Learning from others is not just about individual capacity building. It is also about **knowledge management** and sharing so that others can learn from it. There are resources available to help countries, and DPs, **learn from each other and try to converge on some digital health solutions**²⁷. National assessments of digital health issues that are compiled from **knowledge (data and information) generated at a District/Regional level** enables performance to be assessed and perhaps best practices identified. At a **Regional the same applies. ECOWAS, for example, has taken a proactive role regarding ICT** with a Regional Strategy²⁸ and Human Capital Development²⁹. **At a Global level, the WHO provide a global technology** registry platform containing knowledge about the existence of digital health solutions³⁰. UNICEF too have mapped digital health tools and technologies in 159 countries³¹. Though useful, neither source is comprehensive – in part because its use (by collecting data and uploading digital health solutions) is not yet institutionalised in the work of MoHs. Perhaps if **global resources have country pages that can also be used at a national level institutionalised sharing would become more prevalent**.

- ✓ **Knowledge management at personal, local, national, regional, and global level,**
- ✓ **The lessons learned and current /information e.g. by digital health policy units, and Development Partners need to be considered too.**

5.4 Adapted use cases and tools standards

In all countries, guidance on (best practice) **use cases and processes**, such as monitoring, that can help keep a strategy up to date are lacking. These can be in the form of the pandemic examples provided and used by the DPPA. But there are other more formal frameworks available, **notably the Classification of Digital Health Interventions**³².

Looking to the future, one of the (Core) functionalities that, apart from Ivory Coast, is featured as a “gap” is to do with **One Health**. Future development in digital tools to prepare for pandemics need to address the **cross-sectoral** issues with animal and environmental health, and indeed other sectors if a Whole-of-Government approach is adopted.

²⁶ [PowerPoint Presentation \(globaldigitalhealthnetwork.org\)](http://globaldigitalhealthnetwork.org)

²⁷ [Digital Health Convergence Meeting Tool Kit \(adb.org\)](http://adb.org)

²⁸ [ICT | Economic Community of West African States\(ECOWAS\)](#)

²⁹ [ECOWAS Human Capital Development 2030 | Economic Community of West African States\(ECOWAS\)](#)

³⁰ [DHA \(digitalhealthatlas.org\)](http://digitalhealthatlas.org)

³¹ [Mapping of Digital Health Tools and Technologies in Countries - Google Sheets](#)

³² [WHO-RHR-18.06-eng.pdf](#)

Furthermore, **in Ghana and Togo, telemedicine uses cases** were flagged as areas that could be very relevant in the context of a health crisis.

- ✓ **Understand other uses cases and aspects of a digital health system**
- ✓ **Use cases and processes, as well as standards for digital health tools, need both global and local perspectives**

5.5 Convergence Processes

There are many **initiatives and tools**³³ that could be used to complement the DPPA as they aim at improving the **quality of health data and its governance**³⁴ in digital health systems.

Active involvement of the **donor community and DH Networks**; usage of centralized repositories (National, Regional and Global) and a **“bottom-up”** approach which fosters learning communities and keeps recommendations and interventions updated are all needed.

- ✓ **An active donor and development partner community**
- ✓ **A diverse range of DH Networks that could support the government through the convergence process**

5.6 Summary

As illustrated by the pie diagram below countries have a mix of public, private, faith and NGOs providing health services. Taken together, the Government must have policies that enable them to respond to issues, use digital health application systems and standards appropriately, learn from the results and then plan for the future. This is an ongoing iterative process. Underpinning everything are some foundational issues, in particular connectivity, capacity, and governance. For development partners finding the appropriate entry (and exit) point into the digital health ecosystem is key as is assessing the output and outcomes of their work and assessing its impact.

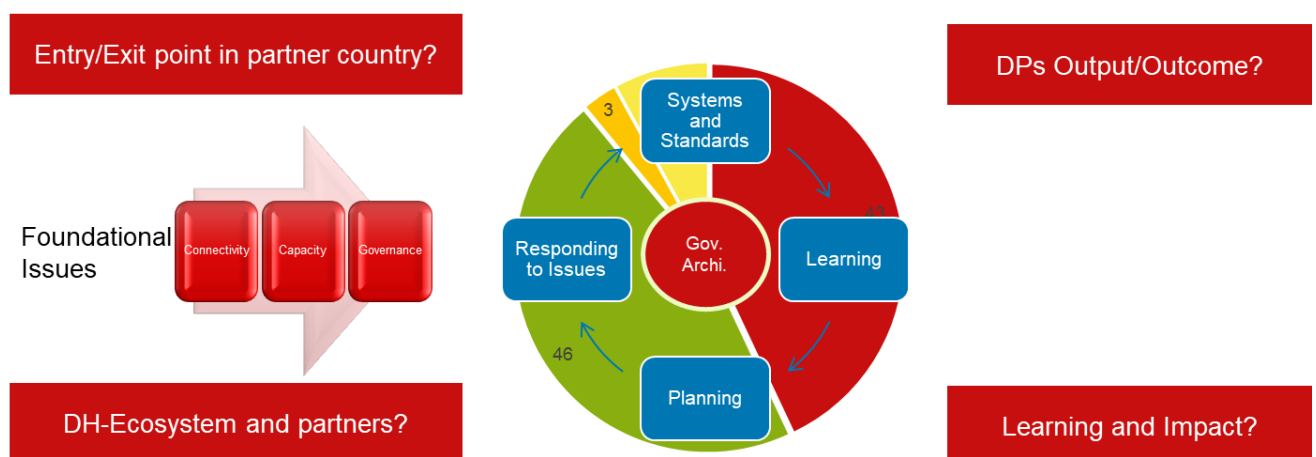


Figure 6 - Required Foundational Aspects of the Country Level DH Ecosystem

³³ [Digital Implementation Investment Guide \(DIIG\): Integrating Digital Interventions into Health Programmes \(who.int\)](#)

³⁴ [opportunity Archive | Transform Health \(transformhealthcoalition.org\)](#)

Whilst Figure 6 is implicitly focused on human health, Figure 7 indicates that there are many other systems which are relevant.

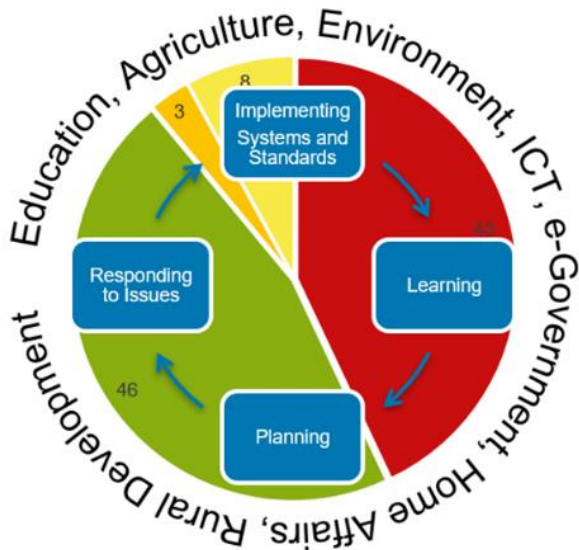


Figure 7 – Health in the context of the wider ecosystem

Understanding and coordinating the interactions with other sectors requires resources, expertise, and (preferably) shared architectures and infrastructures. But so too does the work within the health system. The role of the MoH (working in conjunction with other national level health-related organisations) is to provide the policies that guide these processes. In the context of digital health, a Digital Health Unit is needed to provide the necessary coordination and orchestration.

The digital health systems cycle illustrated below shows the range of issues where a digital health response may be required. Development and Technology Partners will likely be involved in framing the response, and decisions are then made to implement systems and standards. Learning the lessons from implementation includes the knowledge management activities for individuals up to global organisations, and the evolution of a learning culture. This feeds into the planning and strategy development process. Supporting all aspects of the cycle are relevant digital health networks – some may be global, some continental, others regional, and many may exist within countries. They provide guidance and support to ensure progress is made.

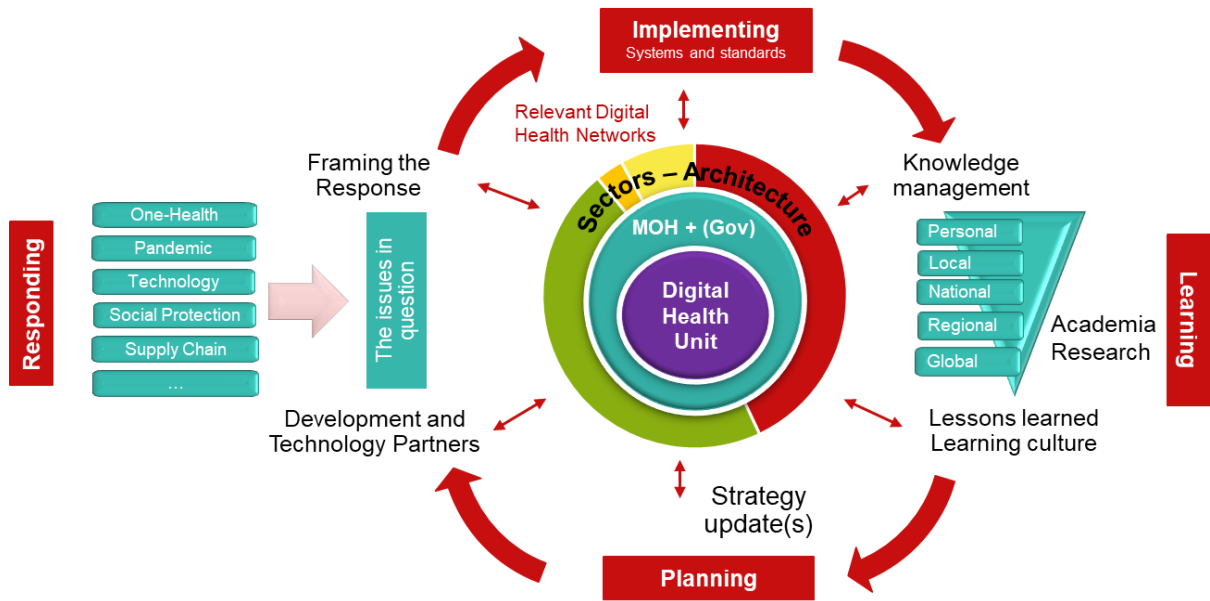


Figure 8 - Draft Framework for Digital Health Systems Cycle (DHSC)

As digital health system cycles mature so countries will become more able to adapt and respond to health challenges. Keeping knowledge of the functioning of the health system (including its interactions with sectors outside health) up to date will lay the basis for better pandemic preparedness as well as improvements in the health system.



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