



**Sierra Leone Health Information Systems Interoperability Workshop
2-4 August 2016 | Bintumani Hotel**

Detailed Meeting Report

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Introduction and Background

The Ministry of Health and Sanitation (MOHS) of the Government of Sierra Leone has steadily stewarded and coordinated efforts and investments aimed at strengthening the entire health system to deliver efficient, effective, high quality and affordable healthcare services. Current prioritization is focused on rebuilding its health sector to ensure full recovery particularly from the deadly effects of the Ebola Virus Disease (EVD) outbreak and ensure effective restoration and long-term resilience of the health system. Additionally, significant reduction in maternal and child mortalities has been prioritized and these two areas form the core of the president's 10-24 months health recovery plan. The MOHS has acknowledged that comprehensive, standards-based and interoperable health information systems that are needs-based will be critical in ensuring the success of the strategies outlined in the President's plan.

Building on this need for more robust and integrated health information systems in Sierra Leone and the efforts initiated by the HIS technical working group, the Ministry of Health and Sanitation, in collaboration with the World Health Organization, and IntraHealth, organized a three day workshop with support from USAID to review the current state of the digital HIS and outline the vision for ensuring interoperability across systems.

The Workshop brought together multiple stakeholders from within the Ministry of Health and Sanitation, other government Ministries, development and implementing partners supporting health programs in Sierra Leone, global Health Information System (HIS) experts and donors. This workshop aimed to promote a common understanding of the existing landscape of HIS in Sierra Leone, encourage dialogue among all the relevant stakeholders and develop a vision, framework and roadmap for promoting interoperability across the different digital and information systems.

Meeting Objectives

1. Review current state of digital Health Information Systems (HIS) functionality and identify obstacles
2. Identify health systems challenges and demonstrate how digital can meet programmatic, health system, and data needs
3. Facilitate consensus on a digital HIS governance and roadmap to inform the strategy, with short-term and long-term milestones
4. Identify relevant investments necessary to achieve roadmap
5. Learn from other country experiences in HIS interoperability and Policy Development
6. Develop and refine digital health scenarios, which reflect the needs of the Directorate of Policy, Planning, and Information (DPPI), as well as programmatic Directorates

Summary of Workshop Outputs

- A collective vision including required governance mechanisms clearly expressed through the Bintumani Declaration comprising of the following six policy statements;
 - Sierra Leone will develop a unified national architecture for our health information systems
 - That we will improve the availability, appropriate use of quality health information across all levels of the health systems



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- We will increase access to and use of health information technology to improve service delivery and demand for services to improve health outcomes
- This process will be led, championed, and sustained by the DPPI for the benefit of all
- We will strengthen our existing governance structure to improve its effectiveness and participation by our partners
- We pledge to seek commitment of government and partners to provide technical and/or financial resources to realize this vision
- Clearer understanding, recognition and appreciation of the history and current state of HIS and challenges contributing to lack of a functional interoperability platform.
- Improved understanding of the concept of interoperability, its value to healthcare services delivery and the process required to achieve sustainably functional interoperability of MOHS endorsed health information systems.
- Identified short-term and long term milestones for the HIS Strategy
- Developed priority use cases, (RMNCAH, eIDSR and HRH), for a digital investment plan and highlighted reusable components that can be reflected in the development of a unified national HIS architecture
- Shared experiences across countries including Liberia, Nigeria and Kenya on processes for developing and implementing HIS strategies and lessons learned
- Key development and implementing partners pledged their continued commitment to support the MOHS invest in interoperability of platforms and the associated governance and technical capacity for strengthening the functioning of technology enabled HIS, including the transitioning of paper to digital.

Recommendations and Way Forward

- The DPPI should consolidate and strengthen its leadership to ensure full implementation of the Bintumani Declaration 2016. This will require rejuvenation of the HIS governance and coordinating structures including the national eHealth steering committee and established technical working groups. Operationally, this may also require rapid update of the TORs to ensure they support realization of the Bintumani Declaration to support execution of the Recovery Plan as a priority for the MOHS.
- Ensure that any investments in digital health and HIS should primarily be informed by the official priority health plans and outcomes of the MOHS. Currently, these are articulated in the President's 10 – 24 months Recovery Plan focusing on two Key Resource Areas (KRAs); 1) Reproductive, Child, Maternal, Neonatal and Adolescent Health (RMNCAH), and 2) Resilient Zero. The KRAs are further broken down into 11 actionable priority initiatives. Operationalization of the Bintumani Declaration should support realization of the desired results described in the Recovery Plan. Furthermore, these short-term investments should be linked into and defined in the HIS strategic plan and RMNCAH strategy, both currently under development.
- The MOHS should prioritize development of interoperability architecture and requisite specifications to support its expeditious operationalization. In parallel to development of an interoperability architecture and roadmap, the DPPI should expeditiously address the following activities through a critical path roadmap;
 - Finalize and distribute a master facility list, accompanied by a process for reviewing and making modifications to it. The DPPI will lead a collaborative process to collectively review the multiple facility lists with an aim to curating, harmonizing and



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merging them into one Master Facility List. The DPPI will then take full custody, manage, publish and disseminate the established MFL that will adhere to global interoperability standards. This process is expected to support other systems and partners to work towards an integrated system.

- Expedite integration of all eIDSR technology development efforts and resources into the main MOHS HMIS and share lessons learned across other program areas.
- Revamp the four technical working groups to improve their performance and impact, with reviewing their work plans and incorporating the needs identified in the workshop into the activities of the TWGs.
- Include and ensure prominent representation of the outputs of the workshop into the HIS Strategic Plan under development by the DPPI (and other programmatic strategic documents like the RMNCAH strategy)
- Recruit additional technical staff to support the DPPI effectively implement and monitor the HIS strategy.



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Day 1: Setting the stage and learning from country experiences

Welcome and opening by Dr Sas Kargbo, DPPI Director:

- Dr Kargbo opened the HIS Interoperability Workshop by laying out the vision for a future state of health information systems, while also providing an overview of the underlying health system challenges. In 2010, the President launched the free health care policy launched to provide free services for pregnant women and children. As the then Director of reproductive health services, Dr Kargbo remarked that data was captured in a fragmented manner that impeded any decision-making or ability to have an accurate and reliable picture of what exactly was happening. Now as the Director of DPPI, Dr Kargbo's vision is to have an integrated health information system, down to the community PHU level, to improve the coverage, quality, and reporting of service delivery.
- However, some of the challenges preventing this vision include multiple agencies funding different areas of work, resulting in disparate reporting systems. Compounding this issue of information being collected in a siloed manner, there is use of both paper-based systems for capturing community and health facility level data, then a digital system for aggregate level data entry at district level, resulting in two parallel (paper and digital) systems. In addition, there is a tremendous burden on those who are collecting data at the health facilities. Approximately 60 percent of health facilities had only one person working there, who is then responsible for completing up to nine monthly forms. Sierra Leone should eventually look into ways electronic data capture at the source, without having to then manually re-enter or displace people to deliver forms, as one way to begin alleviate the data collection burden on health workers.
- Despite these challenges, DPPI has been taking a lead in issues of HIS and data management by forming steering committees. The steering committee then formed into four subcommittees (infrastructure, interoperability, data analysis and use, and governance) to develop work plans and contribute to the HIS Strategic Plan that is now under development.
- With this overview and visioning, the workshop came to an official opening to begin working towards the task of working towards an integrated health information system that is responsive to programmatic needs and eases the burden on health workers collecting data.

Value statement of interoperability: Matt Hulse, USAID

- Health Information Systems (HIS) are foundational pieces of health infrastructure if vital information is in the right hands to help guide policy and budgeting, make decisions to inform patient care, and respond to emerging health priorities. Oftentimes, the national HIS architecture reflects systems that not interoperable or linked to data in facilities. This diversity and fragmentation of systems can have a detrimental effect on health systems, causing inefficiencies in daily work and tempering the decisions made by policy-makers and responders.
- USAID believes in investing in the interoperability of platforms, and the associated governance and technical capacity for strengthening the functioning of technology enabled HIS, including the transitioning of paper to digital. In this light, USAID will continue to support national coordinating bodies, such as the HIS Technical Working Group, and continue to assess HIS ecosystems to feedback into national strategies and roadmaps.



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Embracing HIS and Interoperability to Improve Health Outcomes in Sierra Leone - what is the added value for HIS investments: Brian Taliesin, Path Digital Health Solutions *(PPT slides available)*

- Interoperability is not the technology or the hardware. It is the people. It is the ecosystem of information sharing and collaboration. Different levels of health systems can benefit from interoperability: facilities can reduce the amount of data entered on multiple reports, districts have less paper-based transcription and holistic view of services provided, programs have faster ability to prevent, detect, and respond
- One way to understand interoperability is through a story that connects different people acting within the Health System. A story of Ruth - Mother, Esther - baby girl, Lucy - Nurse at a Public Health Unit was shared showing their interactions with the health system and linking health service delivery to how data flows within the HIS.
- It is important to build incremental steps in addressing high impact areas impact areas as outlined in the President's Recovery Priorities. This is particularly important to demonstrate "quick wins" that contribute towards an integrated Health Information System. Over the course of the next two days, the workshop will look into short-term milestones that can be realized in effort to promote interoperable systems

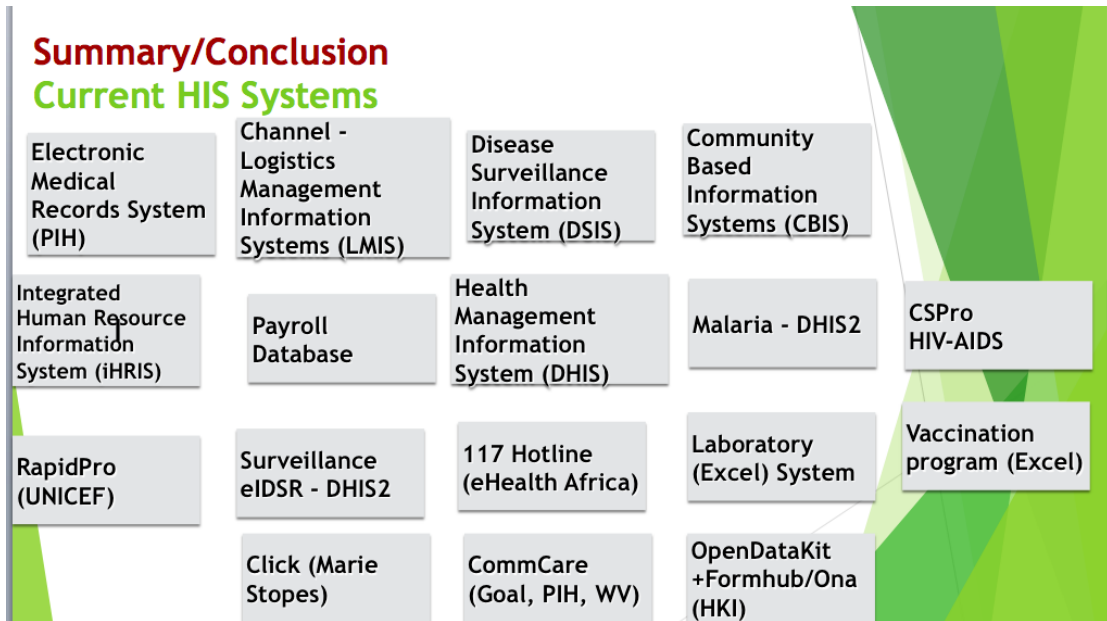
Overview of HIS in Sierra Leone: Mr. Wogba Kamara, DPPI M&E Specialist

(PPT slides available)

- Mr Kamara provided an in-depth summary of the current HIS activities underway in Sierra Leone. There are currently four different sub-working groups of the HIS technical working groups: 1) Infrastructure, 2) Data integration and interoperability, 3) Data analysis and use, 4) Governance and Policy (Terms of reference are outlined in the PPT Slides). There is also a crosscutting group focusing on human resources.
- There is still much work to be done as siloed digital information systems, though the past few weeks have seen efforts towards integration from different programmatic units. For example, Malaria Directorate has begun working towards linking their data with the central DHIS2.
- Other HIS activities in SL include an HIS assessment commissioned by MOH/DPPI on recommendation of the M&E/HIS TWG, with the goal of developing the National HIS Strategic and a costed operational plan. USAID/MEASURE Embedded Advisors supported development of tools, which were reviewed by members of the subgroups
- HIS Assessment started at National level in Nov 2015; District & Facility assessment took place in Dec 2015. Key findings from this assessment indicated a range of infrastructural and connectivity limitations. Findings also indicated that there are no viable data sources for vital statistics and registration are not adequate at all, and health service and surveillance data is present but is low quality and not adequate. *(See PPT slides for detailed overview of HIS assessment)*



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Questions and Discussions:

- o Nutrition Directorate voiced that they have a lot of data and would like to integrate it into the MOHS central DHIS2 database, but perhaps not all the indicators can be accommodated by DHIS2. However, DPPI indicated that it will not be trying to limit indicators and will need the collective support of programmatic directorates.
- o A key issue raised across different programmatic directorates is that implementing partners/NGOs may be collecting their own data and not sharing it with the government. This could be due both to governance issues, as well as perhaps NGOs not aware of the standards or format for integrating their systems. This workshop maintained that the DPPI’s central system should be considered as the one authoritative source for health information systems.
- o There is also a challenge in collecting and linking to data collected directly from facilities. Data collection is also most useful at its source, however the process of aggregating upstream is laborious and vulnerable to a lot of inaccuracy along the way. DPPI indicated that within the next two years, they would like to start having data directly flow from the CHCs. Currently, the staff that that are placed at the CHCs are there to deliver babies and provide health services, not enter data. Different departments have their own tools for capturing information, but what is more important is that there is data quality. Would there be a way to have a different cadre/designated staff for data capture, to alleviate the burden from their other work?
- o The amount of data can also be overwhelming so there should a stronger focus on data that can be useful, and perhaps less data could actually result in better quality information. Adding more data is burdensome and not necessarily useful, if the data is not used. Unicef is providing support on training for data use at district level, which was introduced last month to help promote information that is of relevance to health. The RMNCAH scorecard to color code status of different indicators is also under development with the DPPI and DRCH. If this is rolled out at the district level, could be a way to see their performance.



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- o The ICT infrastructure needs to be taken into account. In SL, there is low connectivity and the strategy needs to reflect the issues surrounding last mile infrastructure.
- o The lack of a widely disseminated master facility list is also a key issue that that needs to be tackled through appropriate governance so that there is full consensus on all facility names. In addition, there should be a well-outlined plan for managing changes to facility names and the approval process for modifying the list.
- o Limited HR and technical capacity is also an area that needs further consideration in order to make strategy implementation a reality. Include staff and capacity building needed in the proposal.
- o Sustainability was a recurring topic that was raised across the three days. In particular, participants highlighted the need to develop sustainability plans, but also the foresight to sustainably finance these plans. For example, when a laptop crashes, ensuring there is a mechanism for maintenance and replacement, when a staff leaves, ensuring there is replacement. The work will not end now, and need to think through sustainability plans beyond donor funding.

HIS Strategic Development: The Liberian Experience: Luke Bawo, MOH Liberia

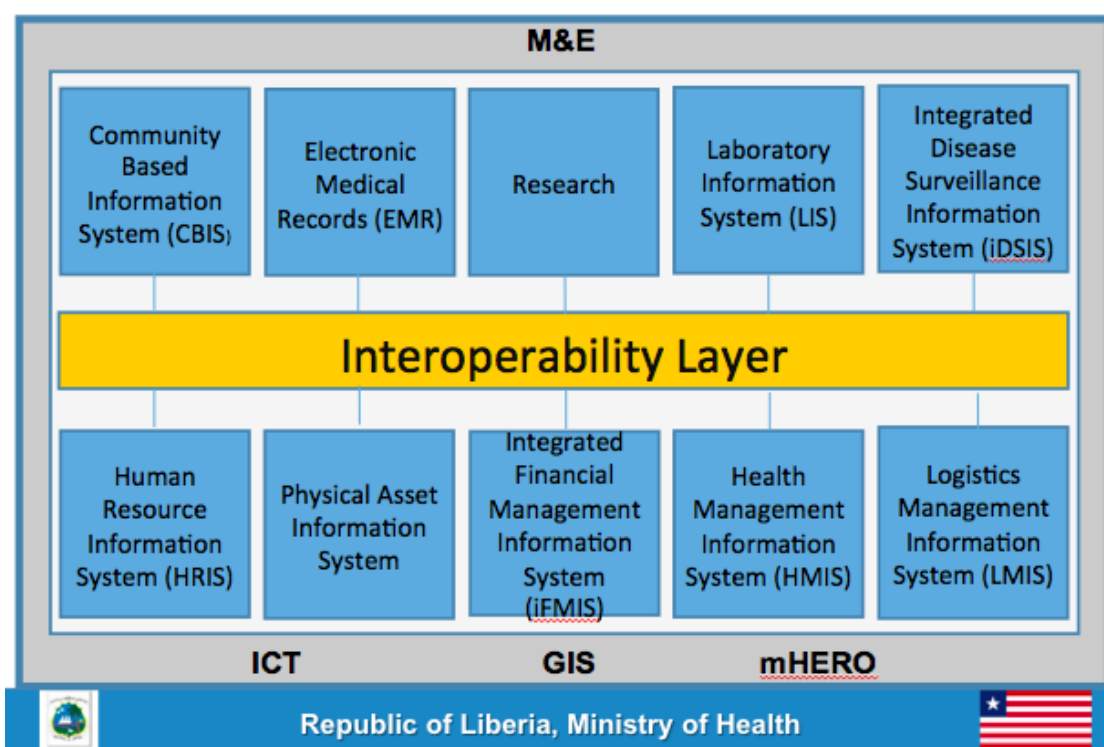
(PPT Slides available)

- When Ebola hit Liberia, Sierra Leone and Guinea, the health systems across all of these countries experienced a breakdown because the HIS was not robust enough to respond in time. At that time in Liberia, there was no HIS strategy and was characterized by system fragmentation; limited development of subsystems; silos; lack of collaboration among partners. There were no linkages between different systems. For example, laboratory system not linked with disease surveillance system
- What did Liberia do? Used Health Metrics Network and adapted it to the Liberian context to develop an integrated HIS strategic plan. Guiding principles included:
 - o **Responding to country needs and demands**
 - o **Building upon existing initiatives and systems:** Recognize which systems are ad hoc and responding only to immediate needs and which systems can serve a long term purpose. During the EVD outbreak, there were many different systems and it was critical identifying which digital systems between which ones could be repurposed and built upon for the overall HIS architecture
 - o **Building broad-based consensus and stakeholder involvement:** HIS does not act isolation and needs to act with program components. This requires a strong leadership and coordination mechanism.
 - o **Gradual and incremental process with a long-term vision:** The vision for the HIS strategy consisted of an overarching umbrella, with subsystems to be developed incrementally: CIS, LMIS, eIDSR, During the HIS strategic plan development, the MOH recognized that not all systems that they want could be operationalized now, but should still be articulated in the vision. This was then accompanied by breaking up the needs across a five-year period, and reviewing what would be needed/prioritized based on Year 1, Year 2,...Year 5.
- Interoperability is important not only to reduce inefficiencies and improve health system functioning, but also to allow more accurate calculation of indicators by working between systems. For example, calculating the total confirmed EVD cases over all the laboratory cases



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submitted. An interoperability layer was used to mediate and link across the different systems. Liberia also established a data warehouses and ensuring that every ad hoc data that is collected is stored in the data warehouse.



- **Lessons from the Liberia experience include:**
 - Bring in more people into the HIS to ensure that there is absorptive capacity for what needs to be done. “Do not let us be the victim of our own success” by laying out a nice plan that has no capacity for execution. One of the ways that Liberia is working to mitigate this is through motivating young people and providing incentives.
 - Show evidence and let the facts help to make decisions. One example was through comparing the costs of a programmatic team collecting their own data versus having an integrated system. When comparing the costs of each team spending money to collect their own information, it was apparent that this approach of fragmented data collection incurred high costs—making the case for an integrated data collection form.
 - “The success of your HIS is not measured by the quantity or the quality of the data it produces but by the decisions made by that data.”
 - Developing the strategy serves as a means to the end, but not an end to the means. Implementing the strategy requires sustained and collaborative efforts.
 - Encourage conversation in a “common” place. Oftentimes, stakeholders may express grievances on a one-on-one basis. This then makes the central person have to negotiate through many different discussions. Instead, discussing these recurring issues at a common venue, such as a meeting, is better both for promoting transparency, governance, and efficiency.



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- o Be realistic, know what you can get, and know what you cannot do. For example, Liberia wanted to have electronic medical records immediately, but recognized that this may not be realistic for year 1.
 - o Dispense with the “Drowning man” mentality. Do not be in a mind-set of thinking that the situation is intractable. Focus on quick wins and achievable milestones.
 - o Build up incrementally. Have the full vision through a collaborative workshop process, but then work backwards to prioritize and assign chronological orders to how the system should be built out.
 - o Be diplomatic but learn to “call a spade a spade.” Although difficult, learn when to say no if something does not fit with the vision. The MOHS needs to be able to direct exactly what they want to do.
- **Discussion with participants:**
 - o You can have the best systems, a functional DHIS2, and integrated HIS architecture but a culture of data use also needs to be there to make use of these systems. There needs to be a “demand” for data and the ability to translate it into decisions.
 - o Bringing people together to sit in the same room and discuss issues is critical. Partners should work together to achieve the interest of the country.
 - o Considerations around confidentiality, data security, ownership etc. need to be taken into account for managing the data systems. The ICT unit is maintaining the server and different areas were considered before having it hosted in-house.
 - o Ministry should provide leadership not controlling. MOHS should be providing leadership on what the HIS needs to do, and then there can be a process of determine which technology platforms could support these needs. There is a difference between an HIS and electronic platform, such as DHIS2, iHRIS, CommCare.
 - o In thinking through sustainability, government should build a system that they are able to sustain in the future. Sustainability is not only about finances but also technical capacity.

Reflections of the Challenges of Health Data Sharing at Scale?: Country examples from Nigeria, Kenya, and Liberia

- **Kenya: (Steven Wanyee)**
 - o The experience in Kenya was mainly in the HIV/AIDS sector as that is where a lot of the initial HIS investments focused. One of the needs was to determine functional requirements for what the Electronic Medical Record (EMR) should do, not how. The specifications of how the EMR would work were later detailed, but it was first crucial to have a common understanding of the different tasks the EMR had to accomplish. The MOH and partners then created six things—functional requirements—that the technology supports. This included having unique identifiers for longitudinal client management and fulfilling monthly reporting requirements.
- **Nigeria: (Olasupo Oyedepo)**
 - o The process of developing the eHealth strategy in Nigeria started to similar to how it is starting in Sierra Leone. The state minister was overwhelmed with the different



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technology systems that were not resulting in any meaningful output. His conclusion was that it was due to suboptimal digital implementations. In order for the ministry to achieve its goals, the MOH had to outline a vision. Close to sixty stakeholders and all the representatives of the 32 states in Nigeria were involved in this development process. The ICT department was nominated by the minister to drive the operationalization of the strategy and empowered the ICT department in a position to ensure that the strategy is being implemented. Once having this common vision, sorting out the technology became easier. When you acquire the interoperability mind-set, you are in a better position to instruct the technology.

- **Liberia: (Luke Bawo)**
 - To make systems interoperable, there should be a unique identifier that will be used to identify these facilities. Different program areas want their own versions of unique IDs (HIV, TB, Malaria, etc.), with fragmented systems. The vision also includes plans to use unique IDs for patients to be rolled out when Liberia begins developing an electronic record system. These are all ideas, which Liberia hopes to implement in the future. Although these may seem like futuristic discussions for several years down, the vision needs to happen now. The technology will come later, but you have to conceptualize what it needs to do.

Summary of Day 1:

Participants were in general agreement and articulated clear need for a coordinated national approach to HIS. Challenges were outlined in terms of managing data use and easing the burden of data collection, developing governance mechanisms to enable interoperability through tools such as a master facility list, and ensuring NGO-led interventions aligned with a central and cohesive digital HIS strategy. Presentations from Liberia, Kenya and Nigeria shared the experience of creating a shared and cohesive vision for the HIS priorities, and an outline of the digital health programs which will be supported by the MOH. The Liberian experience was of particular importance as it presents many lessons learned and approaches that could be relevant for Sierra Leone's development of its HIS strategic plan. These lessons include the need to have a collective and realistic vision based on a consultative process, from which to then work backwards to incrementally build towards that vision based on priorities and available resources.



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Day 2: Defining interoperability and identifying linkages to programmatic needs

Continued learning from other countries

- In trying to link HIS needs with programmatic priorities, this session focused on questions from programmatic directorates, mainly DRCH, on how HIS could be leveraged for some of the health challenge areas. Questions from DRCH related to: knowing what services client want to receive from a facility; engaging with partners and getting reports into HMIS; and the unique patient identifiers for maintaining continuity of care with clients.
- In terms of engaging with partners and compliance to share reports with a central HMIS, it was suggested that directorates do not engage as an isolated unit BUT engage as a unit as part of the MOHS and representing MOH/DPPI. Panellists strongly advised that DPPI is in the room when negotiating with partners on the HMIS reporting. In the Kenyan experience, RMNCAH unit focuses on service delivery and they communicate clearly what they are trying to change. Ensure right people are in the room to ensure what data is collected and how it's used to ensure that intervention works out. The "DPPI" unit works to determine what data is collected. Bring in the specialists to bring tools for data collection and management.
- Unique patient identifiers are a challenge that many other countries also face. This is a discussion that also involves other government partners, even outside the MOHS, as the unique identifiers can be linked with birth registration and other activities outside the mandate of the MOHS. Liberia is also thinking through this question, although the visioning process has indicated that EMRs and unique IDs are not in the work plans for Year 1. The main questions in Liberia are having unique IDs for one client to link to EMR, and having an interconnected system from one hospital to another hospital. In Nigeria, there was an aggressive drive to have a unique bank verification number linked to bank accounts. The government gave a deadline stating that people couldn't access bank accounts without this number. Now 90% accounts have this unique number.
- The challenge is to tell the difference from one person to the other. How can we do this? Using people's demographic information is one way; biometrics and unique identifier is another way. An example was cited by JICA from the National AIDS control program in TZ in which there is a special card with a unique identifier that is kept by the client. Using this unique number on the card, health staff can see where the clients were first registered (district/facility), their CD4 count, when they started treatment, and the regimens given for treatment. At the facility there is a bigger card with more information (symptoms, past history, etc.). All of this information is entered into a computer and managed at a facility level and disaggregated report sent to the district. This was all done on paper and worked well, but digital can allow for more sophistication in follow-up and can be linked to more automated tools, such as SMS reminders.

Defining Interoperability and the Value of Thoughtful Governance: Paul Biondich, OpenHIE (PPT slides available)

- In the same way humans have to talk to each other, computers have to talk to each other. There are international standards such as ICD for clinical diagnosis for everyone to speak the same language. When it comes to computers, they all speak different



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languages. How do you help to make sure they all speak the same language so they can interoperate?

- How do the different systems get to interact with each other? One option is to build roads between the different systems to directly connect the two systems. Or you can build roads that allow a set of homes to be linked together, so that if there are new homes (systems), they can also interact with each other.
- One way to integrate different information systems is to translate the things they say so that can match with each other. Another way is to have a system that can then talk across the different systems. With unique facility identifiers, you can have the different systems map according to this set standard. You can also have a registry of health terms can identify an indicator uniquely. If you have a common registry, it can be reused for common things.
- For example, in Rwanda, they have a medical record that is reporting all of the things that is happening with the mother. Community health workers walk around with phones to input information about the mother, which then is transmitted to the clinic. The different sources of information are brought together using unique identifiers for health terms, health facilities, etc.
- Because of the different information communicated between the different systems, there is an interoperability layer that makes sure the information goes to where it needs to go.
- One way to help promote interoperability is by developing master lists with unique identifiers. For example, the Ministry of Tanzania hosts a master list of facilities, which is all curated centrally. When people make changes, this gets submitted to a central curator. Beyond having a consolidated list, there also needs to be a way to manage the changes and curate new additions to the master list. This is more an issue of governance than technology; the technology is the easy part.
- There are tools and resources to assist with this process. The Open Health Information Exchange ([OpenHIE](#)): virtual community of practice to help countries think about how to plan for architecture. There are a lot of practical tools available on how to operationalize the different aspects related to interoperability.
- You can use a variety of different technologies, as long as they adhere to the standards. The important part is having the clarity to instruct the technology on what you want it to do: Responsible technologies will support the health priorities.
- Other important considerations:
 - The governance is important. Bring the requirements from the broadest set stakeholders.
 - Think around a capacity development plan, and build the capacity to support the implementation itself
 - The upkeep is the most important and who will be there to maintain the systems, and the force the technology to meet your needs
 - The ICT infrastructure needs to be taken into account. In SL, there is low connectivity and the HIS strategy needs to reflect that and be realistic with what will be feasible.

Leveraging existing digital investments: some windows into existing innovations currently in use by MOHS: Shane O'Connor, Unicef and Amanda BenDor, Intrahealth (PPT Slides Available)



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- RapidPro is an open source SMS-based framework that manages data collection and group coordination using basic mobile phones and existing mobile operator networks. It uses the phones that people already have. It connects to Africel and Airtel networks for maximizing coverage across the country and already has established short codes.
- RapidPro is currently in use by the MOHS. One example is in the Food and Nutrition Directorate for a Nutrition Program Monitoring that could be applied to other districts. First rollout of reporting from facilities in Bonthe demonstrated success in the coverage. Rapidpro is also in use by other government partners outside the MOHS, including the Ministry of Education that use RapidPro for tracking and reporting school attendance rates.
- mHERO allows Ministries of Health to support two-way communication with health workers through mobile phones. Use cases (scenarios) and workflows are developed and implemented by the Ministry of Health. mHERO is “quintessential interoperability” as it combines technologies from multiple systems: Facility information that is hosted in DHIS2, Health worker information that is hosted in iHRIS, and then RapidPro to send out appropriate messages to targeted health workers.
- mHERO was launched officially in Sierra Leone in July with messages sent to 8,000 MOHS staff. IntraHealth has been supporting the MOHS, primarily the HRH Directorate for the rollout of mHERO. Short term goals for mHERO in Sierra Leone include: reminders to district data managers reminders for submitting their reports to DHIS2, curate in-service training needs of RMNCH providers, and even motivational messages to all health workers about Ebola successes. Long term opportunities for mHERO include automated updates of health worker validation into iHRIS and routine data collection that can feed into HMIS and LMIS. There are many opportunities for leveraging mHERO, so MOHS is encouraged to identify areas of how communication between health workers could support priorities.
- mHERO was first piloted and scaled in Liberia starting in 2014 during Ebola outbreak. The Liberian MOH owns mHERO as their platform and has been included in the Liberian HIS and ICT Strategic Plan (2016 – 2021). It is now being used in Liberia for a wide variety of use cases implemented including FP commodity, nutrition, and mental Health.

Breakout groups: What is needed in your programmatic area (RMNCAH, HRH, and eIDSR)?

- In this session, participants were tasked with thinking through digital interventions and HIS interoperability in the context of different programmatic areas. Breakout groups focussing on RMNCAH, Human Resources, and eIDSR were used to reflect on the following questions:
 - What are the challenges you have that you think can be better addressed through improved digital systems?
 - How can digital technologies better help you meet your programmatic and data needs?
 - What would be the process to achieve improved digital enhancements in your unit?
 - What solutions for interoperability and digital health needs to be reflected in the HIS Strategy to help you meet these needs?
- Detailed reports from the breakout groups are elaborated in **Annex 2**, with the key themes highlighted below:
 - Define and include governance structure, including a decision making tree for “final approval” of systems and standard operating procedures for data sharing



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- Create interoperability linkages between government supported systems such as DHIS2 iHRIS. This would require advancing efforts on an interlinked registry to enable interoperability between iHRIS and other systems, including mHERO and payroll verification system.
- Improve access to and use of data systems, so that data are easily digested, streamlined, and timely data for DHMT
- Across programmatic directorates, establish a system to create reports which track patients, particularly in health areas where there are challenges of loss to follow-up (i.e. RMNCAH, nutrition, HIV, etc.)

Summary of Day 2:

Day 2 honed in on the inclusion of programmatic needs into the HIS strategic plan and areas for potential digital investments. Country experiences highlighted some of the approaches in linking programmatic areas to HIS, including the use of unique identifiers, which serve both purposes for clinical follow-up, as well as being a necessary component of the HIS. The day also featured a deep dive into defining interoperability and how it has been operationalized across other African countries. A key theme across these presentations was that the technology is the easy part; having the governance, trust between partners, and clarity on what the technology needs to do is the more difficult and critical part. The latter half of the day focused on developing scenarios and ideas for priority focus areas in which technology could play a role. Teams reflecting HRH, RMNCAH, and eIDSR brainstormed on gaps, and identified digital health needs to be reflected in the HIS Strategy.



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Day 3: Paving the Road to the HIS Strategy

The roadmap - what do you want to do when?

Participants were asked to write 1-2 specific requirements related to digital systems and interoperability that you would envision to be in the HIS Strategy, and by when (Year 1, 2, 3, 4 or 5). Details from this feedback are listed in Annex 2, by the years in which participants expected them to be delivered. Overwhelmingly, participants identified most of the priorities to be completed in Year 1. This activity demonstrated the need to plan a roadmap that is achievable and realistic, taking incremental steps to achieving the HIS Vision for Sierra Leone.

Reflections from Luke Bawo, MOH Liberia and Olasupo Oyedepo (ICT4Health Nigeria):

- The listed items are way more detailed than what happened in Liberia. Year 1 is fully loaded. As Sierra Leone is doing its strategy, stakeholders need to see how the items can be distributed. The strategy should be realistic, and there are some basic guidelines.
- Ensure there is a logistical time sequence. Rationalize the suggested activities and ensure they are appropriately sequenced and in a way that will incrementally make time and resource sense.
- For example, you cannot suggest training on new reports in year 1, without thinking about the reports in year 2.
- Think about the turnaround time, the budget, and requisition process. Think about the availability of funds that you have on hand. You may have the resources, but not the time or the human capacity.
- As you are doing the strategy, don't be afraid to ask for help. It is strength when you say you don't know.
- Four key themes jumped out: Governance, HR, technology, and infrastructure. Think through how you want to prioritize these different themes. In Nigeria, governance was a fundamental issue that had to be prioritized before and technology decisions could be made.

Reviewing the roadmap needs: What would it take to enact these activities?

Adewale Akinjeji, WHO

- Think about all kinds of capacity required to successfully implement these activities. We need to ensure that these activities are aligned with available budgets and appropriately think about technical capacity to execute these needs.
- There is a lot of detail that needs to be further elaborated on within these statements. "Form follows function" - there is a very different standard for creating reporting data versus creating patient data. Pick some critical health care information sharing scenarios and use those as a starting point for defining the requirements and the standards to use.
- It is important to have a common document that clearly spells out data sharing. DPPI has a consultant working directly with programs under the guidance of DPPI to ensure that appropriate stakeholders can access data.
- There is a parallel system being used to DHIS2. Inasmuch as DHIS2 can accommodate the information needs and required indicators, DPPI does not want to support multiple systems. However, the DHIS2 form can be supported with other more detailed reporting documents.



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- The list generated by participants on what they would like to include in the HIS Strategic Plan needs to be reviewed with programs.
- Some entity needs to be able to coordinate through one appropriate body. This needs to be decided very early on. Your language needs to be broad enough to encompass a digital functional classification broadly (mobile health initiative) versus small and limiting classifications (SMS messaging).

Coordinating digital health: the Digital Health Atlas, Garrett Mehl & Tigest Tamrat, WHO

- The Digital Health Atlas is a resource to help the MOH classify, monitor and manage digital health implementations. Over the past two days, we heard from the MOHS the need to better understand what NGO partners are doing in terms of digital deployments, the data they are collecting, and where they are implementing. Knowing this information can both help to reduce duplication and ensure that activities are aligned with MOHS priorities. On the other hand, having this overall knowledge of what is being implemented in the country can enable the MOHS to see what is already happening and possibly expand activities of interest to new geographical areas.
- The Digital Health Atlas lists out what is happening, with clickable links to understand more details about the program. It presents a country overview map and inventory list. WHO has been developing the Digital Health Atlas globally and this tool could serve as a coordination resource in light of the conversations of the past two days.
- Comments from participants:
 - It may be worth sitting down with DPPI and SLA Committee for a one page that could be filled in to update this. If used in Sierra Leone, the Digital Health Atlas needs to be owned and managed by the government, although there are features that would be of value to implementers and donors as well.
 - Unicef is currently working on a MOHS repository website - for people to access data and relevant information on policies, activities, and other planning resources in Sierra Leone. There may be a way to align the Digital Health Atlas as part of the resources available on the MOHS website.

Reflections from DPPI: Dr. Sas Kargbo

- At the Ministry of Health and Sanitation, we are committed to improving and modernizing our information systems towards better health outcomes for Sierra Leone. The role of health information systems are critical not only for data and measurement, but also for delivering on universal health goals, ensuring better health outcomes, and the ability to protect, detect and respond to emerging health priorities.
- Over the last three days, the MOHS, is proud to have worked with the World Health Organization, IntraHealth, USAID, the US CDC, and a collection of expert NGO partners to host an international workshop to plan for a dynamic future of our country's health information systems.
- The objectives of this meeting were to familiarize the community with our ongoing work to make recommendations for our health information systems strategy, identify health care



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challenges that are best supported through IT, and to design practical solutions based upon the experiences from other African countries.

- We couldn't be more pleased with the engagement and feedback we received from key stakeholders throughout our country, and appreciate the support we received from our ministry colleagues from Liberia, Nigeria, Kenya, and others.
- We were also very pleased to have our discussions facilitated by IntraHealth and WHO, who have been an important partner for us in this work along with USAID, UNICEF, JIC JSI, Options, eHealth Africa, World Vision, CHAI, Goal, among others.
- There was strong consensus amongst the participants that we are well positioned to accelerate the process of integrating information technology with our health system in a deeper way going forward.
- We as the DPPI of the MOHS acknowledge the need for increased availability and timely access to quality health data to improve the health of our citizens. We recognize and reiterate our vision to create a unified national architecture for our health information systems, consistent with international best practices for their design.
- We believe this architecture will eventually allow all of the health information systems to communicate effectively with one another and work in concert to support the ministry's health delivery goals.
- We accept that this vision won't happen unless there's strong coordination and leadership from the Ministry of Health and Sanitation. The DPPI is deeply committed to this vision and the legacy of health improvement it will enable. As such we, the DPPI, on behalf of the MOHS, will lead in organizing and coordinating this work in the years to come
- While we are not yet optimally set up as a division to take on this significant and evolving responsibility, we commit to evolving our directorate in collaboration with the various other directorates within the MOHS and other ministries in our national government. I assure you that the DPPI is fully committed to leading the Health sector through these changes.

The Bintumani Declaration: Dr Sas Kargbo, DPPI

The Bintumani Declaration represents an official policy position by the MOHS for one central data architecture coordinated by DPPI on behalf of the MOHS. The MOHS through the DPPI will provide firm and visionary leadership in the implementation of the Bintumani Declaration, but through a concerted effort with all directorates.

The Bintumani Declaration: August 4, 2016

We, the stakeholders here gathered, under the firm leadership of the MOHS through the DPPI, hereby declare:

- Sierra Leone will develop a unified national architecture for our health information systems;
- That we will improve the availability, appropriate access and use of quality health information across all levels of the health system;
- We will increase access to and use of health information technology to improve service delivery and demand for services to improve health outcomes;
- This process will be led, championed, and sustained by the DPPI for the benefit of all;
- We will strengthen our existing governance structure to improve its effectiveness and participation by our partners;



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- We pledge to seek the commitment of government and partners to provide technical and/or financial resources to realize this vision.

The Ministry of Health and Sanitation and its partners endorsed these declarations -dubbed the Bintumani Declarations - made on this 4th day of August 2016.

Reflections from participants:

- Incorporate a way to put the health workers into the declaration. This can include a stakeholder meeting with health facility staff to share what we have discussed.
- Although this Declaration will be led by the DPPI, other Directorates need to be involved and also take ownership of this process to ensure their needs are reflected in the HIS strategy.

Closing remarks: Dr Anders Nordstrom, WHO Representative

- WHO is proud to support this effort on interoperability and it comes at a timely time where the proliferation of data and information systems results in human resource and cost implications on the health system. Better coordination is required to the inefficiencies of data collection, aggregation and use. Organizations, including WHO, need to be more critical about data requirements and not adding to the problem by over burdening health workers with data collection. In previous work, there were efforts to consolidate how much data was needed and synthesize core indicators. This effort needs to be sustained and much work is required ahead in order to improve overall health system functioning and use of health information systems.

Summary of Day 3:

Day 3 began with participants reflecting and listing out concrete items they wish reflected in the HIS strategic plan. This list demonstrated the high demand for standard operating procedures and protocols for exchanging data with systems, particularly as it relates to HMIS. Many of the needs participants raised were proposed for first year, and these suggestions need to undergo further consideration on how to be executed based on available resources, absorptive capacity, and logical sequencing. The workshop then culminated in DPPI expressing its official policy position by the MOHS for one central data architecture. The Ministry of Health and Sanitation and its partners endorsed these declarations -dubbed the Bintumani Declarations--to carry out a vision for unified national architecture for the health information systems.

Next steps/Milestones:

Short-term next steps (<3 months)

- Finalize and distribute a master facility list, accompanied by a process for review and making modifications/updating the master list. DPPI could lead a collaborative process to collectively review currently facility lists and manage the curation process. By publishing/disseminating a master facility list that adheres to interoperability standards, other systems and partners can be in a better position to work towards an integrated system.
- Expedite integration of eIDSR technology development efforts and resources into the main MOHS HMIS



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- Revamp the four technical working groups to improve their performance and impact, with reviewing their work plans and incorporating the needs identified in the workshop into the activities of the TWGs.
- Include and ensure prominent representation of the outputs of the workshop into the HIS Strategic Plan under development by the DPPI (and other programmatic strategic documents like the RMNCAH strategy).

Midterm next steps (4 months – 1 year)

- Commence development and costing of the national HIS architecture, with prioritizing the needs of Resilient Zero and RMNCAH priority areas
- Include clear description of partners' HIS responsibilities and support in the Service Level Agreement (SLA) based on the declarations of this workshop
- Strengthen the HR technical capacity of the DPPI to deliver on the HIS needs and strategic plan. This will include:
 - Cross border exchange study tours between Sierra Leone and Liberia
 - Define the expanded role of the DPPI specifically to enable it take up the defined roles required to fully implement the Bintumani Declaration.
 - Supporting trainings both at central and district levels, recruiting appropriate additional human resources, linking to global practitioners for technical support, and exchanging lessons from other countries.
- Reallocate and mobilize additional resources as required to support successful implementation and achievement of these milestones.

Long-term next steps (> 1 year)

- Enforce and operationalize the strategic plan, reflecting on outputs of this meeting and needs defined for subsequent years.



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Annex I. What is needed in your programmatic area for HIS and Interoperability? (RMNCAH, eIDSR, and HRH groups)

What are some of your programmatic and data needs that may be addressed through improved digital systems?	How can digital technologies better help you address these needs? And what would be that process?	What measures will be needed to ensure these interoperability and digital health needs are reflected in the HIS Strategy?
<p>RMNCAH, Nutrition, HIV, Malaria,</p> <ul style="list-style-type: none"> • Lack of infrastructure – not enough coverage • Mobile device knowledge and skills – not all health workers have the same skills • Cost of SMS for some users • Lack of unique identifiers for patients • Identification of nutritional status of children under 5 at facility and community level • Limited ability to understand the workload of clinical staff and volunteers related to the population they are expected to serve 	<ul style="list-style-type: none"> • Create reports which track patients who are lost to follow up • Data collection process to register the identified child. This should be linked to a database to collect the measurements and record information • Ensure that the database does not double-count the kids (unique identifiers) • Ensure this database can also analyse the facility level data • Develop digital tools for screening protocols and analysing the nutritional status of the child • Alongside any digital intervention, non-digital approaches should also be considered to address the challenges. For example, there may be HR issues in improving the capacity of staff to properly collect measurements 	<ul style="list-style-type: none"> • Identify the current process for how clients are registered • Create a RapidPro-based system to register and remind patients of appointments • Identify the data needed by different levels of the health sector • Design/agree the data to collect • Provide training to health workers on implementing this program • Launch the program in a small amount of clinics • Evaluate the program and change if needed, then scale nationally • Create interoperability between other identified platforms like DHIS2



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What are some of your programmatic and data needs that may be addressed through improved digital systems?	How can digital technologies better help you address these needs? And what would be that process?	What measures will be needed to ensure these interoperability and digital health needs are reflected in the HIS Strategy?
<p>eIDSR</p> <ul style="list-style-type: none"> • Lack of data sharing • Lack of timely and accurate data • Unsustainable systems in place for data reporting • Data awareness (Demand side) • Data visualization tools, to support data analysis and report generation • Lack of human resource capacity to support data system use • Data storage, backup, filing and security • Outbreak detection 	<ul style="list-style-type: none"> • Leverage the Technical Working Groups (TWG) to discuss requirements for system and bring together stakeholders and directorates of MOH • Develop an integration plan and timeline with clear objectives • Define user roles and responsibilities • Define indicators, sources of data and how to collect. Document this data aggregation process for overall transparent understanding • Have properly trained staff • Improved connectivity national (targeting hard to reach areas) • Manage transition plan of partners/NGOs with TORs and SLAs • Pilot uses with other ICT Tools • Document lessons learned • Ensure a champion at every level/identify key individuals with prior knowledge (TA) 	<ul style="list-style-type: none"> • Clearly define and determine ownership and include language in HIS strategy • Determine which ICT tools/platform the MOH will use in short-term, including the specifications of the selected tools • Define and include governance structure that includes decision making tree for “final approvals” • Identify indicators to measure progress • Have separate accounts for HMIS • Develop templates and standards for data sharing, data control, and data security. • Identify internal and external partners and clear roles • Establish terminology dictionary • Increase internet mobile coverage, supported by policies • Expand and build capacity within DPPI and partnering directorates in order to execute needs articulated in the HIS Strategic Plan. This can include, but not limited to, trainings both at central and district levels, recruitment of additional human resources, linking to global practitioners for technical support, and exchanging lessons from other countries.



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	What are some of your programmatic and data needs that may be addressed through improved digital systems?	How can digital technologies better help you address these needs? And what would be that process?	What measures will be needed to ensure these interoperability and digital health needs are reflected in the HIS Strategy?
HRH	<ul style="list-style-type: none"> • Management of payroll for government health workers. The HRM manages payroll linked with the Ministry of Finance. Integration across these different sectors (HRD, HRM, and MOF) is important to have for interoperability. • Remote areas are unattended and therefore PHUs are staffed with volunteers who do not get salaries and funding challenges prohibit the ability to do spot checks • Low motivation of health workers especially in rural areas. • Recruitment challenges for health workers. Health workers are part of the wider civil services and therefore MOHS do not have mandate to recruit. The HR Directorate needs to initiate process and the request goes to the Human Resource Management Office (HRMO), which is the 	<ul style="list-style-type: none"> • Link payroll and iHRIS data – need to use master facility list and facilitate interoperability between the two systems. HRD, HRM and MOF to agree on management of the process. • Payroll management –Export/integrate data on payroll information into iHRIS and provided technical assistance on updating and managing iHRIS. • Utilize the interlinked registry for attendance monitoring. • Provide distance learning including innovative eLearning to health workers especially those in remote places as an incentive (note that the HRD is developing a HR strategic plan) • Use digital systems to accurately manage rural health workers so they are not leaving posts • Consider providing incentives or allowances for remotely based health workers allowance – utilize mobile money payments. 	<ul style="list-style-type: none"> • Establish interlinked registry between internal ministries, such as HRMO and Ministry of Finance for payroll • Ensure iHRIS is updated with payroll information. A suggested approach is a digital system where personal information of health workers can be entered by MOHS officers for attendance monitoring. Payroll for the health workers can then be linked with the health workers' attendance utilizing the interlinked registry. • Utilize mHero to collect data on additional information on health workers or verify iHRIS information • Utilize mHero to connect with health workers to share information, send motivational messages and provide distance learning • Ensure interoperability with other iHRIS subsystems • Ensure decentralization of iHRIS to district level HRMOs – partner support will be needed to build infrastructure and capacity.



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What are some of your programmatic and data needs that may be addressed through improved digital systems?	How can digital technologies better help you address these needs? And what would be that process?	What measures will be needed to ensure these interoperability and digital health needs are reflected in the HIS Strategy?
<p>mandated agency for recruitment.</p> <ul style="list-style-type: none"> • System is set up to decentralize HRH but there are capacity challenges to implement HRH management at the district level • No tracking of pre-service and in-service training of health workers 	<ul style="list-style-type: none"> • Use mHero to connect with health workers including training; motivational messages; closed user groups among health workers and coordinating with district health officers. • Rollout iHRIS to districts. Build capacity and infrastructure for district HRMOs to manage their own instances. 	



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Annex 2: What does the HIS strategy need to include, and by when?

For Year 1:

- **Governance**

- Develop policies and standard operating procedures for data security and storage (and backup) to support sustainability of HIS.
- Draft standards for integrating mobile applications with DHIS2 for data entry.
- Draft standard operating procedures for data integration and interoperability so systems can be linked for easy sharing of data, including internally within the country and externally.
- Make decision about a standard system and data exchange protocol.
- Develop standard operating procedures highlighting the process when upgrading the data warehouse and subsystems within the HMIS.
- Develop Standard Operating Procedures and minimum standards that will guide the HIS roll out process.
- Develop clear guidance and policies for data standardization (e.g. data collection, data dictionary)
- Make a decision about a standard system and data exchange protocol.
- Develop SOPs for data verification and validation.
- Ensure the submission and completion of hard copies of summary tables at the facility/hospital. Have data officers ensure the transmission of data into the systems, and availability of summary forms.
- Create easily accessible overview of programs and data collected.
- Document existing systems and prevent parallel systems.
- Review existing system methodically and appropriately for different programmatic areas.
- Multi-stakeholder involvement in HIS strategy design and implementation. Specifically to include each cadre of HCW who are expected to input data into the HIS but whose primary responsibility is clinical care to ensure HIS demands don't detract from these tasks, particularly in context of HR. This should also include the community to understand and ensure their concerns are addressed. All stakeholders that will use the data at the district and central level should also be involved.

- **HR/ Technical capacity**

- Mobilize all the CHWs across the country through the support of the MOHS and to ensure they lead improvement of RMNCH services using SMS
- Regular visiting health staff to CHW members of the community to ensure the validity of data. CHW should report on a daily basis on issues and events in his/her community.
 - Program officers should ensure adequate staff/human resources, adequately trained staff, smooth operating of facilities and disseminated across all sectors of system operations.
- Develop national database that tracks the annual number of people graduating from all health training institutions.



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- Deploy trained financial officers at district level to track government budgets and expenditures.
- Early and continued training and supporting supervision of all actors engaged with the HIS, combination of standard SOPs and ad hoc issues. This should specifically focus on the HCWs who have to input the data into the HIS and also include users of data at the district and central level.
- **Infrastructure**
 - Provide cell phones and tablets as means of communication to enable CHW to receive and send data.
 - Advocate for resource mobilization facilitate the availability of the required infrastructure and technical capacity in all the districts.

Year 3

- Ensure a dedicated budget for HIS at all levels. Advocate that budget line items are included in MOHS and District Council budgets to cover HIS and ICT costs.
- Advocate for a development and implementation of an ICT budget policy that will facilitate increased budget for procurement, maintenance, and adequate internet bandwidth, GPS devices for Smartphones and institutionalization of data connection devices.
- Maintain a central control by MOHS over the human resource working in the HIS at all levels of administration.
- Increase capacity of the HIS administration and management at MOHS and District levels by recruiting statisticians, epidemiologist, and database administrations.
- Strengthen capacity of HIS staff through in-service training and graduate programs on various areas, such as HIS, biostatistics, research and data analysis.

For Year 5:

- Provide power and connectivity to all health facilities.



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